

LELY JUNO 150

Feed Pusher



Operator Manual

5.4301.8501.0 - Lely Control

EN - English Original



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Lely Industries N.V.

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Lely Industries N.V.
Cornelis van der Lelylaan 1
3147 PB Maassluis
the Netherlands
Phone: +31 (0)88 1228221
Fax: +31 (0)88 1228222
Website: www.lely.com



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WARRANTY RESTRICTIONS

Excluded from this warranty are any cost or expenses due to:

- Abnormal use of the equipment which is not according to the specifications stated in the Operator Manual or handled during the Operators Service and Maintenance Certification program.
- The result of any intervention by technicians other than Lely service technicians or technicians who have Lely's approval to perform certain duties.
- Incidents such as freezing, ice, fire, flood, inundation or any other form of excessive water, lightning.
- Defect of the electrical system or grounding.
- Hacking activities, viruses or the like.
- Damage to the electrical system as a result of vermin or the like.

Warranty does not apply to consequential damage which does not involve the machine itself.

All systems are tested. However in the event of a malfunction Lely cannot be held responsible for consequential damage.



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LIST OF INCLUDED AMENDMENTS

No:	Issue Date (yy/mm)	Chapter(s)	Remarks
6	14/06	All	Bluetooth operation added Pause button added Operator manual separated
5	11/09	All	Product name changed to "JUNO 150"
		4, 6	Feed groups added
		4, 6	Push power for feed groups added
4	10/07	All	Full revision of the manual - Software changes are incorporated - Manual complies to the new documentation standard
		2, 4, 5, 6, 8, 9	Rewritten: safety devices, component description Added: new pictures (new position inductive sensor) Added: updated software description (Modify Route) Added: new procedure 'Adjust the inductive sensor' Updated: alarm list
3	09/11	2, 4, 5, 7	Added: description, installation and maintenance procedures with reference to the safety bar and the battery stop
2	09/03	2, 4, 8	Added: safety decals, installation safety decals, description feed push power, procedure adjust the feed push power, description new multiboard pcb
1	08/12		Initial issue



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PREFACE

Manual Contents

This manual contains the information necessary to operate the JUNO 150 Feed Pusher.

Study and understand this information thoroughly before you operate the JUNO 150 Feed Pusher. Failure to do so could result in personal injury or damage to equipment. Please consult your local Lely service provider if you do not understand the information in this manual, or if you need additional information.

All information in this manual has been compiled with care. Lely shall not be liable for errors or faults in this manual. The recommendations are meant to serve as guidelines. All instructions, pictures and specifications in this manual are based on the latest information that was available at the time of publication. Your JUNO 150 Feed Pusher may comprise improvements, features or options that are not covered in this manual.

Applicability

The table below shows the type numbers of JUNO 150 for which this manual is applicable and the software version the procedures are based on.

Model designation

Model	Type number
Lely JUNO 150 Feed Pusher	5.4301.0020.1

Software version

The description, operation and procedures in this manual are based on the software version:

- ADS 3840 PCB: JUNSv01.07.XX
- ADS 3641 PCB: 1.2.41 or higher
- Lely Control app Android: 1.2.23 or higher.

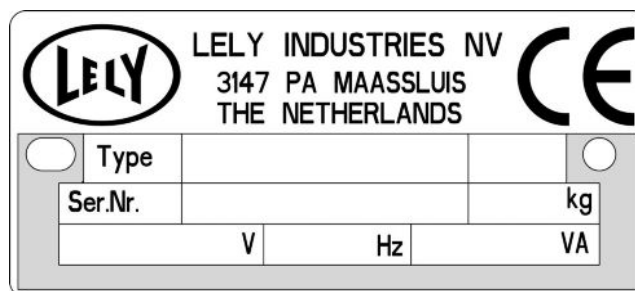
Standard Torque Loading of Parts

All the nuts, bolts and screws used on the JUNO 150 Feed Pusher are torque tightened to standard torque loadings applicable to the construction materials used.

If a part has a non-standard torque loading, it is specified in the applicable part of the manual.

Registration

The Type and Serial Number Plate is attached to the front side of the JUNO 150 Feed Pusher. Always include the type and serial numbers of JUNO 150 when you contact your local Lely service provider or order spare parts.



Type and Serial Number Plate

We suggest you complete the table below with the type and serial numbers of your JUNO 150. This makes sure you can easily find the information.

Type number	5.4301.0020.1
Serial number	

Maintenance Authorization



Only technicians certified by Lely Industries are authorized to do corrective maintenance on the JUNO 150.

If people who are not certified by Lely Industries do maintenance on the JUNO 150, the warranty on the JUNO 150 becomes invalid.

Before a technician does maintenance on a JUNO 150, the owner must examine the service pass of the technician and make sure the technician is currently certified to do maintenance on the JUNO 150.

Technician Training

All the technicians certified by Lely Industries have completed an approved training program, and passed written and practical examinations during and at the end of the training program. The examinations are done under supervision of a product specialist and include troubleshooting and corrective maintenance of the JUNO 150.

There are five certification levels:

- Installation Technician (certification valid for two years)
- Service Engineer (certification valid for two years)
- Senior Service Engineer (certification valid for two years)
- Product Specialist (certification valid for one year)
- Master Product Specialist (certification valid for one year).

During training, a trainee is permitted to work for up to a maximum of six months on a JUNO 150 in the presence of a certified technician.

When the training program is completed successfully, Lely issues a certificate and a service pass to the technician. The service pass contains the following information:

- The name of the technician
- A photograph of the technician
- The certification number of the technician
- The date of expiry of the certification.

Contact Number Local Service Provider

We suggest you write the telephone number and email address of your local service provider contact in the table below. This makes sure you can easily find the information.

Telephone number	
email address	



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Table of Contents

1.	Introduction.....	1-1
2.	Safety.....	2-1
2.1	Introduction.....	2-1
2.2	Signal Icons.....	2-1
2.3	Safety Instructions.....	2-1
2.3.1	Electrical Safety.....	2-2
2.3.2	Operating Safety.....	2-2
2.3.3	Maintenance Safety.....	2-4
2.4	Safety Decals.....	2-4
2.4.1	Safety Decal Messages.....	2-4
2.4.2	Installation of Safety Decals.....	2-7
2.4.3	Maintenance of Safety Decals.....	2-8
2.5	Safety Devices.....	2-8
2.5.1	Emergency Stop Button.....	2-8
2.5.2	Pause button.....	2-8
2.5.3	Protection Ring.....	2-9
2.5.4	Safety Bracket.....	2-9
2.5.5	Interlocking Lid.....	2-9
2.5.6	Acoustic Warning Device.....	2-9
2.5.7	Hardware Safety Protection.....	2-10
2.5.8	Software Controlled Charging System.....	2-10
2.5.9	Fuse.....	2-10
2.5.10	Overload Protection.....	2-10
2.5.11	Battery.....	2-10
2.5.12	Battery Stop.....	2-10
3.	Specifications.....	3-1
3.1	Feed Pusher.....	3-1
3.1.1	Dimensions and Weight.....	3-1
3.1.2	Battery.....	3-1
3.1.3	Operation.....	3-1
3.1.4	Miscellaneous.....	3-1
3.2	Charging Station.....	3-2
3.2.1	Dimensions and Weight.....	3-2
3.2.2	Battery Charger.....	3-2
3.3	Requirements Smartphone.....	3-2
4.	Description and Operation.....	4-1
4.1	Introduction.....	4-1
4.2	Component Description.....	4-2

4.2.1	Feed Pusher Vehicle.....	4-2
4.2.2	Charging Station.....	4-8
4.3	User Interface.....	4-9
4.3.1	Work.....	4-10
4.3.2	Routes.....	4-13
4.3.3	Settings.....	4-22
4.3.4	Alarms.....	4-23
4.3.5	Service.....	4-24
4.4	Operation.....	4-24
4.4.1	Routes, Actions, Manual Routes and Time Paths.....	4-24
4.4.2	Control System.....	4-25
5.	Operating Instructions.....	5-1
5.1	Install or Update the Lely Control app on Your Smart Phone.....	5-1
5.2	Rename the JUNO 150 on the Smartphone.....	5-1
5.3	Set the farmer password.....	5-1
5.4	Open or Close the Lid.....	5-2
5.5	Switch ON or OFF the JUNO 150.....	5-2
5.6	Operate Device Specific Software with a Smartphone.....	5-3
5.7	Start the Software on Your Smartphone.....	5-3
5.8	Manually Drive the JUNO 150.....	5-4
5.9	Drive the JUNO 150 to the Charging Station.....	5-5
5.10	Prepare for Programming.....	5-5
5.10.1	Requirements for a Good Route.....	5-5
5.11	Program the JUNO 150.....	5-6
5.11.1	Program a New Route.....	5-6
5.11.2	Copy a Route.....	5-10
5.11.3	Modify a Route.....	5-10
5.11.4	Reset a modified Route to the previous Version.....	5-10
5.11.5	Delete a Route.....	5-11
5.11.6	Set or Delete a Manual Route.....	5-11
5.11.7	Define Feed Groups.....	5-12
5.11.8	Define the Push Power for a Feed Group.....	5-12
5.11.9	Set a Time Path.....	5-13
5.11.10	Make a Backup.....	5-13
5.11.11	Copy a Backup file from the Smartphone to a PC.....	5-14
5.11.12	Copy a Backup file from a PC to the Smartphone.....	5-14
5.12	Start or Stop Timed Actions.....	5-14
5.13	Start, Stop or Pause a Manual Route.....	5-15
5.14	Block a Route.....	5-16
5.15	Reset the Emergency Stop Button.....	5-16
6.	Maintenance.....	6-1

6.1	Introduction.....	6-1
6.2	Preventive Maintenance Schedule.....	6-1
6.3	Preparation.....	6-1
6.3.1	Break or close the Power Circuit.....	6-1
6.3.2	Remove or Install the Cover.....	6-2
6.3.3	Switch OFF or ON the JUNO 150.....	6-4
6.4	Maintenance Procedures.....	6-5
6.4.1	Clean the Charging Strips and the Charging Electrodes.....	6-5
6.4.2	Adjust the Skirt Height.....	6-6
7.	Test and Adjustment.....	7-1
7.1	Introduction.....	7-1
7.2	Settings.....	7-1
7.2.1	Set the Real-Time Clock.....	7-1
7.2.2	Set the Display Language.....	7-1
7.2.3	Modify the Beep Frequency for a Route.....	7-2
7.2.4	Modify the Beep Length.....	7-2
7.2.5	Modify the Feed Push Power.....	7-2
7.3	Tests.....	7-3
7.3.1	Analyse the Reliability of a Route.....	7-3
7.3.2	Test a Route.....	7-3
7.3.3	Make sure the Battery is Loaded.....	7-3
7.3.4	Make sure the Battery is Charging.....	7-4
7.3.5	Make sure the Bluetooth Connection is Reliable.....	7-4
7.3.6	Test the Ultrasonic Sensor.....	7-5
8.	Troubleshooting.....	8-1
8.1	Introduction.....	8-1
8.2	Alarms and Reports.....	8-1
8.2.1	Recover alarms.....	8-1
8.2.2	Alarm List.....	8-2
8.2.3	Read a Report.....	8-13
8.2.4	Report List.....	8-13
8.2.5	Information Report List.....	8-15
8.3	Troubleshooting Tables.....	8-16
8.3.1	Troubleshooting Table JUNO 150 Vehicle.....	8-16
8.3.2	Troubleshooting Table JUNO 150 Charging Station.....	8-18
8.4	Recovery Procedures.....	8-19
8.4.1	Reset the System.....	8-19
8.4.2	Calibrate the Gyroscope.....	8-19
8.4.3	Charge the JUNO 150.....	8-19
9.	Diagrams.....	9-1

Glossary of Terms



— innovators in agriculture —

Index

5.4301.8501.0 - Lely Control

1. INTRODUCTION

The JUNO 150 Feed Pusher is a battery-driven vehicle that pushes the forage towards the feed fence of the barn. This gives the cows better access to more fresh food through the day. The rotating lower part of the side of the JUNO 150 pushes the forage against the feed fence while the vehicle drives along the feeding alley.

The dairy farmer (operator) uses the Lely Control app on the smartphone to program the route to be followed by the JUNO 150. Routes can be programmed flexibly. The dairy farmer has the option to do more feed pushing in some areas of the barn during certain hours of the day.

The information in this manual is for operators. The operator uses the information to program and operate the JUNO 150. The operator also uses the information to do maintenance.

The operator must read the operating instructions for daily operation and for the setup of routes and time paths. He must read the test and adjustment section for the setup and for testing the JUNO 150 and routes. He must also read the maintenance and troubleshooting sections for preventive and basic corrective maintenance instructions.

The operator should refer to the description and the operation section for background information. The operator must also read and understand the safety instructions in section 'Safety'.



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2. SAFETY

2.1 Introduction

The JUNO 150 Feed Pusher is an automated machine. Therefore it is of the utmost importance to obey all safety instructions.

The safety alert symbol identifies important safety messages on your JUNO 150 Feed Pusher and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instruction of the safety message.



Safety Alert Symbol

2.2 Signal Icons

Note the use of the signal words DANGER, WARNING and CAUTION with the safety messages. The signal word for each message uses the following guidelines:



Danger: indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.



Warning: indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed.



Caution: indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury or product or property damage.



Note: this shows extra information that may help the reader.

2.3 Safety Instructions

YOU are responsible for the SAFE operation and maintenance of your JUNO 150 Feed Pusher. YOU must make sure that you and anyone else who is going to operate, maintain or work in the vicinity of the JUNO 150 knows all the related SAFETY information in this manual.

YOU are the key to safety. Good safety practices protect you and the people around you. Make these practices a working part of your safety program. Make sure EVERYONE who operates, maintains or works near the feed

pusher obeys the safety precautions. Do not risk injury or death by ignoring good safety practices.

- JUNO 150 owners must train operators before they operate the JUNO 150. This training must be repeated at least annually
- The operator must read, understand and obey all safety and operating instructions in the manual
- A person who has not read and understood all safety and operating instructions is not permitted to operate the JUNO 150
- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety and could affect the life of the equipment, and persons
- Only use approved spare parts, and make sure they are only installed by authorized technicians.

2.3.1 Electrical Safety

- Only an authorized electrician must install the electrical power supply for the charging station of the JUNO 150.
- Make sure the electrical grounding of the electrical system and all parts of the charging station of the JUNO 150 meet the local rules and regulations.
- Replace any damaged electrical lines, conduits, switches and components immediately .
- Switch the power OFF with the OFF button on the ADS 3840 PCB before you start to work on the system.
- Pull the plug from the socket before you start to work on the charging station.

2.3.2 Operating Safety



Remote operation of the smartphone or tablet by remote desktop software (such as, but not limited by, Teamviewer) is strictly forbidden to avoid dangerous situations.



The maximum amount of energy the electric pulse of the collision detector transfers is 15 mJ (at 500R). This does not harm cows or humans.

- Read and understand this manual and all safety signs before you connect power supplies to operate, maintain or adjust the JUNO 150
- Only trained persons are permitted to operate the JUNO 150
- Make sure all covers are installed before you operate the JUNO 150
- Make sure the safety bracket is installed on the front side before you operate the JUNO 150
- Only operate the JUNO 150 in a closed and marked feed alley
- The JUNO 150 shall be operated under supervision only or in areas that are not accessible for unauthorized people, especially small children

- Keep hands, feet, hair and clothing away from all moving parts
- Never touch the collision detector when the JUNO 150 is moving to avoid an electric shock
- Contact your nearest Lely service provider if you have any questions
- Review safety related items with all operators frequently (annually)
- Make sure the slope of the floor is no more than 3 degrees (4 cm per 100 cm).

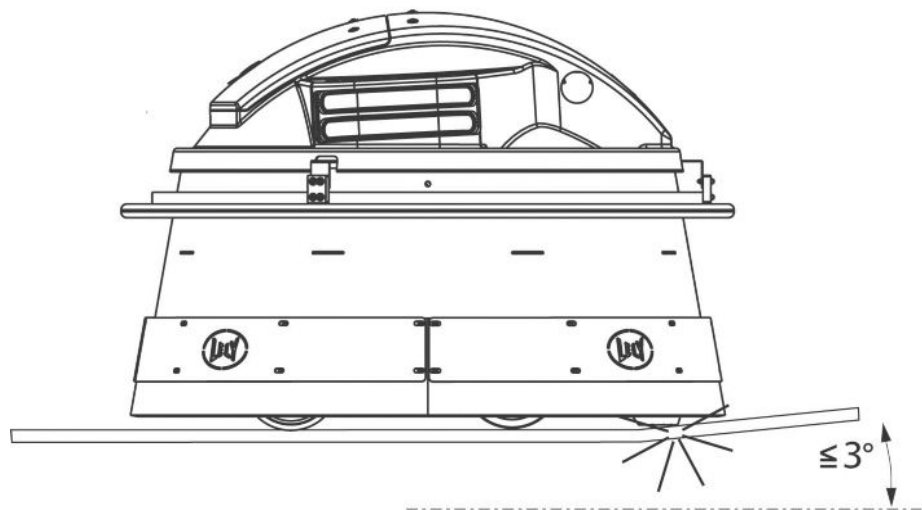


Figure 1. Maximum slope

i

The maximum amount of energy the electric pulse of the collision detector transfers is 15 mJ (at 500R). This does not harm cows or humans.

Cows are deterred from touching the vehicle by an electric pulse which is activated when driving the route. The pulse is on the collision detector (see figure on page 2-4) (1) that surrounds the vehicle.

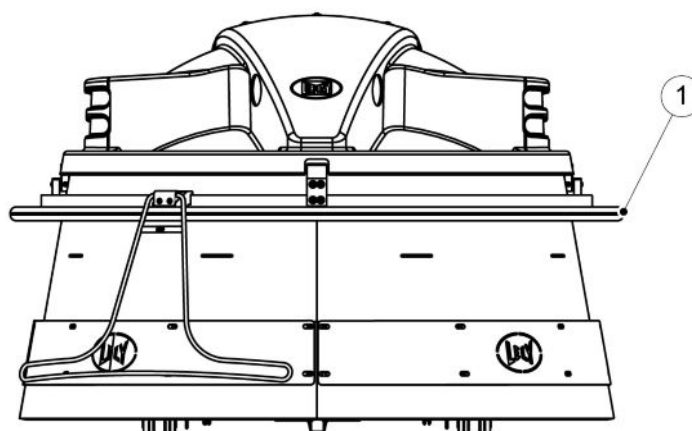


Figure 2. Areas with Electric Pulse

KEY:
1. Collision detector

2.3.3 Maintenance Safety

- Read and understand the applicable manual and all safety signs before you connect power supplies to operate, maintain or adjust the JUNO 150
- Only trained persons are permitted to do corrective maintenance on the JUNO 150
- Keep tools and metal parts away from the battery
- Disconnect and isolate the electrical power supply before you do work on the JUNO 150
- Do NOT spout water on the body of the JUNO 150. Use a wet brush to clean the JUNO 150
- Make sure all covers are installed when maintenance work is complete.

2.4 Safety Decals

2.4.1 Safety Decal Messages

General safety messages appear in this safety messages section. Specific safety messages are in applicable parts of this manual when potential hazards may occur if the instructions or procedures are not followed.

2.4.1.1 Rotating Parts - Entanglement Hazard



Figure 3. Rotating Parts - Entanglement Hazard Symbol



***Danger of being entangled by rotating parts.
Keep hands, loose clothing, and long hair away from moving parts
during operation of the JUNO 150.***

2.4.1.2 High Voltage - Electric Shock Caution



Figure 4. Electric Shock - High Voltage Symbol



***Electric shock.
Keep away from the collision detector during operation of the JUNO 150.***

2.4.1.3 No Admittance for Unauthorized Persons



Figure 5. No admittance for unauthorized persons



***Only persons who have read and understood all applicable safety
instructions are allowed to enter the area.***

2.4.1.4 Danger - Do not Sit on Vehicle / Keep Safe Distance



Figure 6. 'Do not sit on the vehicle' and 'Keep safe distance' decal (Canada and USA)



Figure 7. 'Do not sit on the vehicle' and 'Keep safe distance' decal (except Canada and USA)



**Do not sit on the vehicle.
Keep safe distance.**

2.4.1.5 Danger - Area with Unmanned Autonomous Vehicle



Figure 8. Area with unmanned autonomous vehicle decal



The safety decal 'Area with unmanned autonomous vehicle' must be installed on a highly visible place near the entrance of the barn.

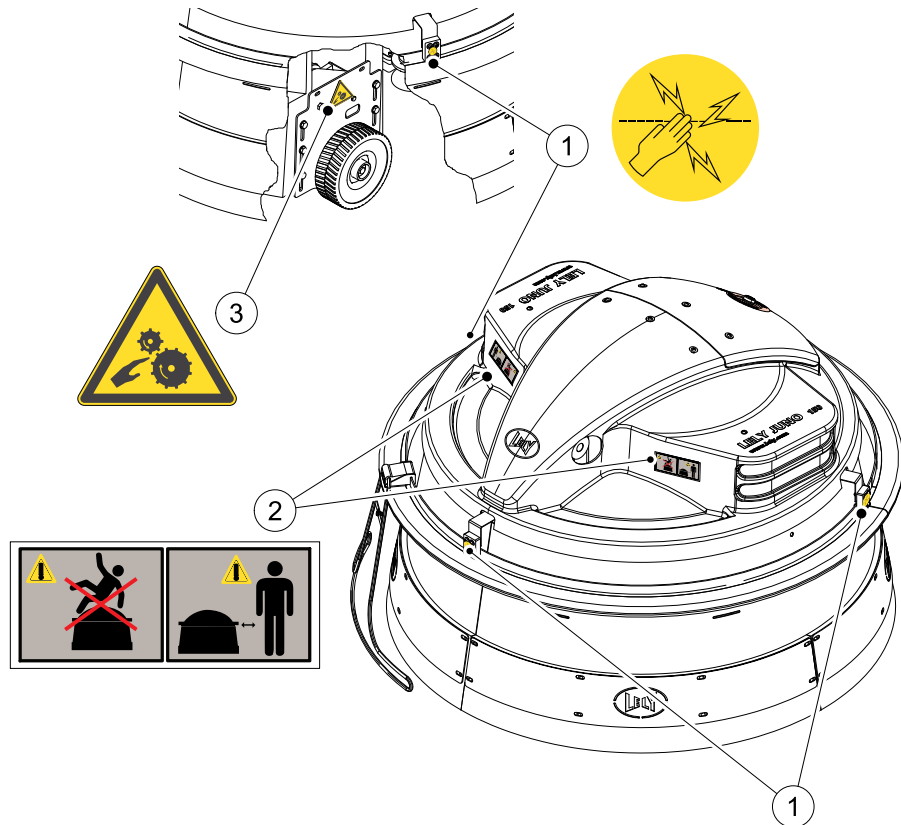


Figure 9. Position of the safety decals

KEY:

1. Electric Shock - High Voltage Symbol - 2. 'Do not sit on the vehicle' and 'Keep safe distance' decal - 3. Rotating Parts - Entanglement Hazard Symbol

2.4.2 Installation of Safety Decals

1. Make sure the installation surface is clean and dry.
2. Make sure the temperature of the mounting surface is not less than 5 °C (41 °F).
3. Identify the correct position for the decal before you remove the backing paper.
4. Remove a small part of the backing paper.
5. Put the decal in the correct position on the mounting surface and carefully press the small part of exposed adhesive surface of the decal onto the mounting surface.
6. Slowly remove the backing paper and attach the rest of the decal to the mounting surface.
7. Puncture small air pockets in the decal with a pin and use the backing paper to smooth the decal.

2.4.3 Maintenance of Safety Decals

Safety decals on the JUNO 150 Feed Pusher display important and useful information that will help you safely operate and maintain the JUNO 150.

Obey the instructions below to make sure all the decals stay in the correct position and condition.

- Keep the safety decals clean and legible at all times. Clean the safety decals with soap and water. Do not use mineral spirits, abrasive cleaners or other similar agents that may damage the safety decals
- Replace safety decals that are missing or are illegible
- Safety decals can be purchased from your local Lely service provider.

2.5 Safety Devices

2.5.1 Emergency Stop Button

An emergency stop button (see figure on page 2-11) is installed on the top of the JUNO 150. The emergency stop button is accessible with the cover of the JUNO 150 closed (see figure on page 4-1).

When the button is pressed, the JUNO 150 immediately stops operation.

To reset the emergency stop button, turn the button clockwise and pull it out until it unlocks.

2.5.2 Pause button

A pause button is installed on the JUNO 150. When the pause button is pushed while the JUNO 150 is in operation, the JUNO 150 goes into pause mode:

- The JUNO 150 stops.
- The LED light in the pause button turns on.
- The operational sound of the JUNO 150 is turned off.
- The user interface on the smartphone displays a question to resume or cancel the route.

When the pause button or the button in the Lely Control app is pushed shortly while the JUNO 150 is in pause mode, the JUNO 150 goes back into work mode:

- The JUNO 150 goes back into operation.
- The LED light in the pause button turns off.
- The operational sound of the JUNO 150 is turned on.

The pause button can be operated remotely with the Lely Control app on the smartphone.

If an alarm occurs, the LED in the pause button blinks. The alarm must be confirmed with the Lely Control app on the smartphone.

Status of the JUNO 150	LED status of the pause button
Start up	Blink
Out of operation. Lely Control app in main tab menu Work	On
Out of operation. Lely Control app in other menu	Blink
JUNO 150 paused	On
JUNO 150 in normal operation	Off
Alarm	Blink

2.5.3 Protection Ring



The maximum amount of energy the electric pulse of the protection ring transfers is 15 mJ (at 500R). This does not harm cows or humans.

The JUNO 150 has a rubber protection ring (see figure on page 2-11) that stops the vehicle immediately when the vehicle hits an object that is at least 60 cm above floor level. The reaction of the JUNO 150 depends on the object type.

- If the vehicle hits a solid object (for instance a tractor), the JUNO 150 drives back until there is no contact with the obstacle. After 2 seconds the vehicle tries to continue its route. If it hits the object again, it drives back again (until there is no contact), stops and generates an alarm message.
- If the vehicle hits an object that is not solid, or if a cow bites the ring, the vehicle waits 2 seconds and tries to continue its route. If the collision detector is activated 4 more times (within 50 cm), the vehicle stops and generates an alarm message.

The protection ring has a pulse on it while the JUNO 150 is driving a route.

2.5.4 Safety Bracket

The safety bracket (see figure on page 2-11) on the front actuates the protection ring when it hits an object that is less than 60 cm above floor level. The JUNO 150 immediately stops.

2.5.5 Interlocking Lid

The JUNO 150 has an interlocking lid that shuts off the power whenever it is opened. The JUNO 150 stops immediately when the lid is opened. The detector is integrated in the emergency stop button device.

2.5.6 Acoustic Warning Device

An acoustic warning device alerts persons and cows when the vehicle starts to move, moves or when an alarm occurs.

The beep lengths and beep frequencies of the acoustic warning device are:

Operational state of the JUNO 150	Beep frequency acoustic warning device
Normal operation	Once per 2 seconds (default)
An alarm occurred	3 short beeps every minute

The acoustic warning device (page 2-11) is installed on the JUNO 150.

2.5.7 Hardware Safety Protection

All safety devices are controlled by software and hardware. If the software fails, the hardware takes over.

2.5.8 Software Controlled Charging System

The operational software of the JUNO 150 controls the charge system. This allows to keep the vehicle connected to the charging station when it is not moving, even if the battery is fully charged. The software prevents overcharging the battery and keeps it fully charged until the next operation.

2.5.9 Fuse

The ADS 3840 PCB has a one-time-use fuse that breaks the circuit in the event of a power malfunction or an electrical short-circuit.

2.5.10 Overload Protection

The drive motors are protected against overload. If the current is high for a long time the overload protection operates and stops the JUNO 150 to prevent overheating. An alarm message is also generated.

2.5.11 Battery

The battery is filled with gel and is completely sealed to protect it against leakage.

2.5.12 Battery Stop

The battery stop is used to disconnect the battery. It is installed on the battery.

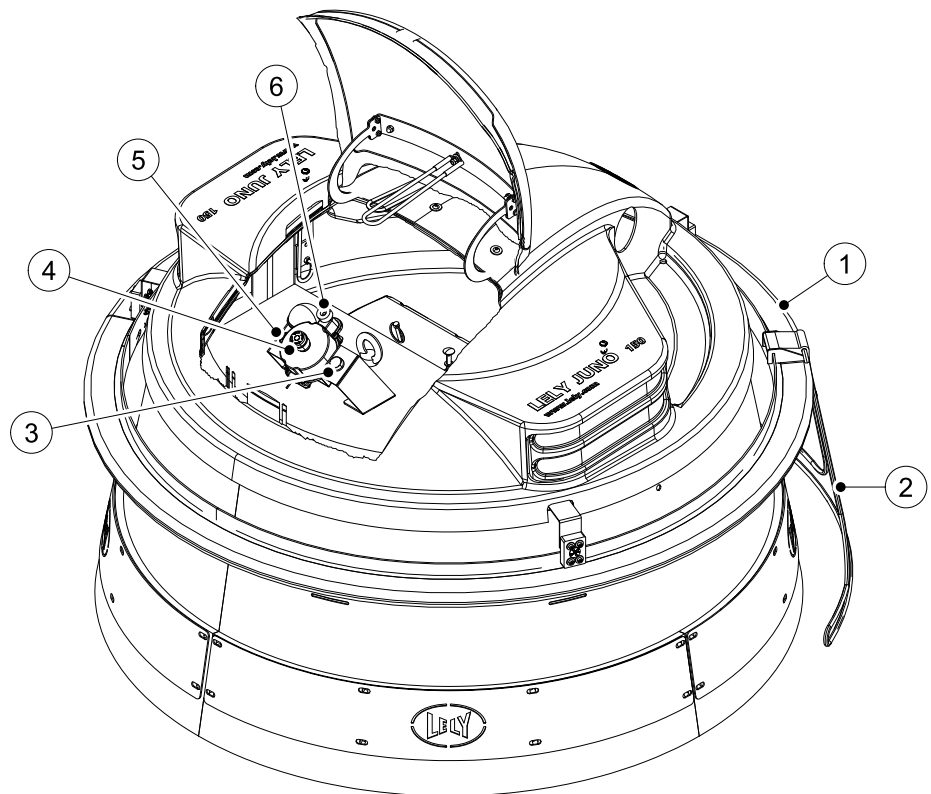


Figure 10. Position of the safety devices

KEY:

1. Protection ring - 2. Safety bracket - 3. Pause button - 4. Emergency stop button - 5. Acoustic warning device - 6. Interlocking switch lid



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3. SPECIFICATIONS

3.1 Feed Pusher

3.1.1 Dimensions and Weight

- Diameter: 156 cm (61.4 in)
- Height: 106 cm (41.7 in)
- Weight: 575 kg (1268 lbs)
- Rotating part height: 60 cm (23.6 in)
- Maximum width of feed: 200 cm (78.7 in)
- Maximum height of feed: 75 cm (29.5 in).

3.1.2 Battery

- Number of batteries: 1
- Weight: 19.9 kg (43.9 lbs)
- Nominal voltage: 12 V
- Capacity: 55 Ah
- Charging time: 6 hours maximum
- Spare capacity: 120 min
- Length: 254 mm (10.0 in)
- Width: 174 mm (6.9 in)
- Height, including battery terminals: 195 mm (7.7 in)
- Height, excluding battery terminals: 173 mm (6.8 in)

3.1.3 Operation

- Number of different programmable routes: max. 16
- Number of actions per route: max. 125
- Number of routes per time path: max. 48
- Maximum duration of a time path: 24 hour
- Travel speed: 12 m/min (display: 200)
- Maximum driving time without charging: 2 hours
- Route programming: with the Lely Control app on smartphone.

3.1.4 Miscellaneous

- Drive: 2× electric motor
- Number of wheels: 3
- Average power consumption: 0.05 kWh
- Determination of direction of motion: using gyroscope
- Determination of distance to feed fence: using ultrasonic sensor
- Determination of distance travelled: via encoders on motors
- Calibration points: Metal stripes along feed alley.

3.2 Charging Station

3.2.1 Dimensions and Weight

Charging station

- Width: 37 cm (14.6 in)
- Depth: 25 cm (9.8 in)
- Height: 62.5 cm (24.6 in)
- Weight excluding floor column: 40 kg (88.2 lbs)
- Weight including floor column: 84 kg (185.2 lbs).

Floor column

- Width: 37 cm (14.6 in)
- Depth: 10 cm (3.9 in)
- Height: 210 cm (82.7 in)
- Weight floor column: 44 kg (97 lbs).

3.2.2 Battery Charger

- Type: Exendis (9-1188-0027-0)
- Input voltage: 180 - 240 VAC / 50 Hz or 115 / 60 Hz
- Output voltage: 17 VDC
- Max. charge current: 20 A
- Safety features: reversed connections, short circuit
- Weight: 2 kg (4.4 lbs)
- Length, excluding battery terminals: 200 mm (7.9 in.)
- Width: 150 mm (5.9 in.)
- Height: 70 mm (2.8 in.).

3.3 Requirements Smartphone



Use of a tablet is technically possible if it meets the specifications. However, the user interface might not be displayed optimally since it is designed for smartphones.

- Screen resolution 480 x 800 (or higher).
- Android 2.3.x, 4.0.x or 4.2.x.
- Bluetooth version 2.0, 2.1, 3.0, 4.0 dual mode (4.0 single mode is not supported) .
- Compliance with 1999/5/EC european directive for Radio and Telecommunications Terminal Equipment.
- For software updates a WiFi or 3G network must be available.
- Processor: 1 GHz (or higher).
- Android smartphone must have at least 10 MB free storage.

4. DESCRIPTION AND OPERATION

4.1 Introduction

This chapter describes the parts of the JUNO 150 Feed Pusher. It also explains how the parts work together to push the feed to the feed fence.

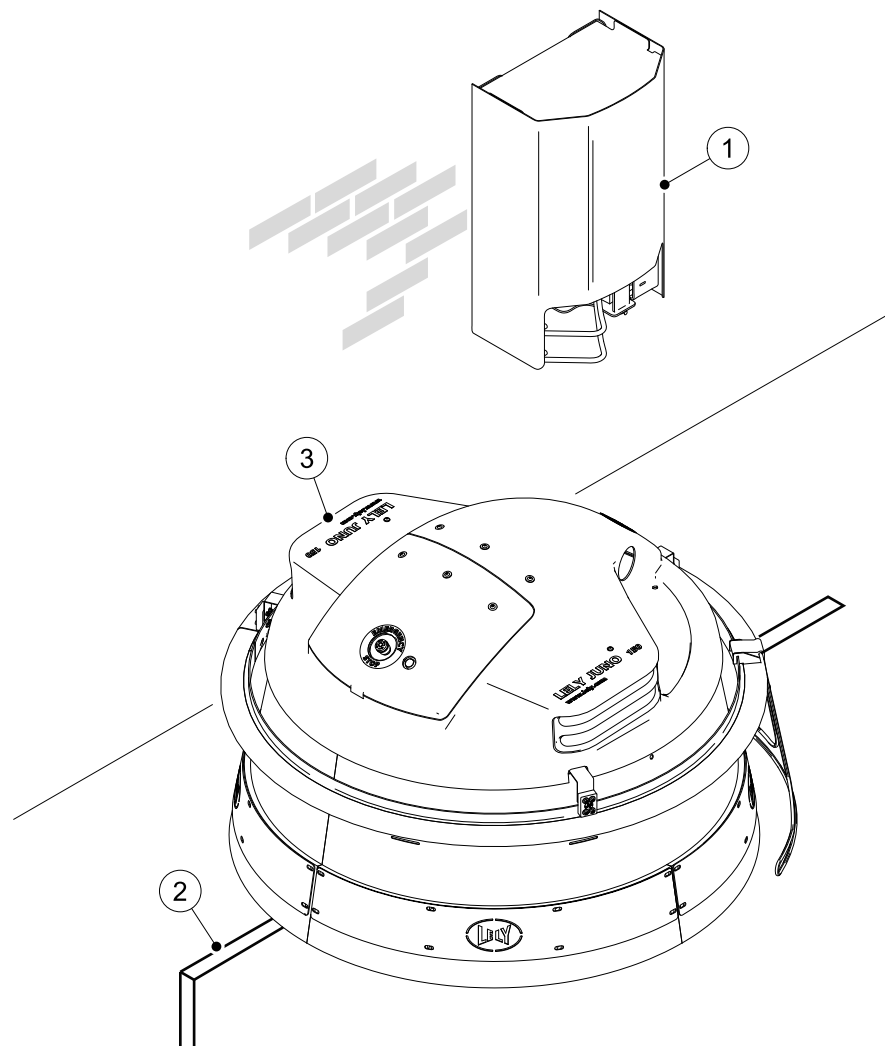


Figure 11. Main components

KEY:

1. Charging station - 2. Metal guiding strip (90 mm) - 3. Juno vehicle

4.2 Component Description

4.2.1 Feed Pusher Vehicle

The feed pusher vehicle has the following main components:

- Cover
- Skirt
- Concrete block
- Driving mechanism
- Power system, to store and distribute power
- Control system, to control the JUNO 150 using the programmed route and sensors
- Shock system.

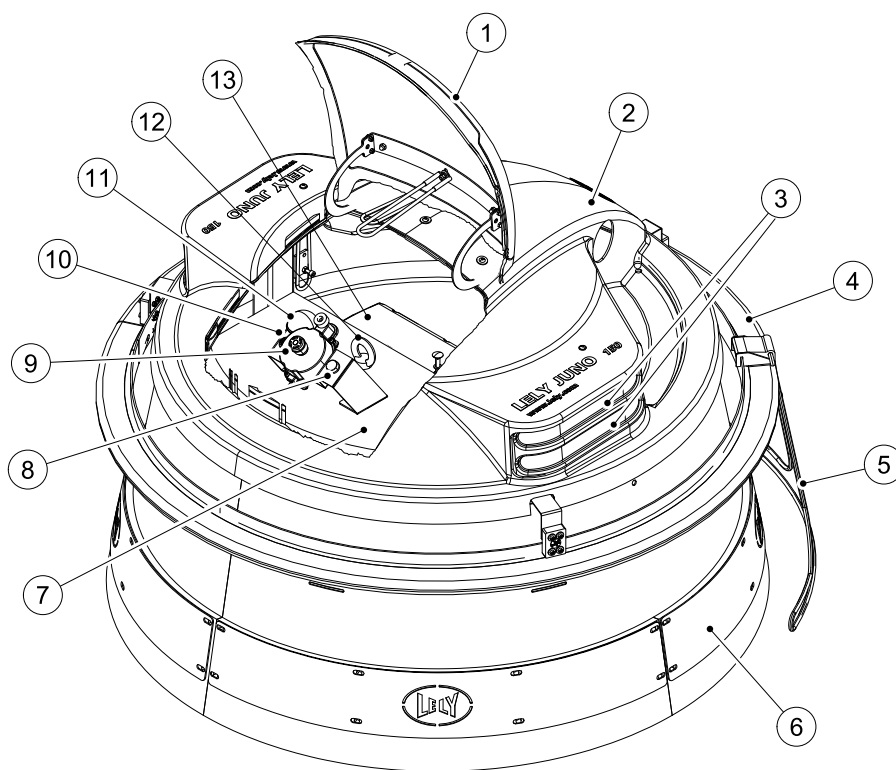


Figure 12. Main components JUNO 150 Feed Pusher

KEY:

1. Hinged lid - 2. Cover - 3. Charging strips - 4. Interlocking protection ring - 5. Interlocking guard - 6. Skirt - 7. Concrete block - 8. Pause button - 9. Emergency stop button - 10. Acoustic warning device - 11. Bluetooth antenna - 12. Hoisting eye - 13. ADS 3840 PCB-box with ON/OFF buttons

4.2.1.1 Covering



Do not operate the JUNO 150 without the cover to ensure proper functioning.

The JUNO 150 has:

- Cover
- Hinged lid
- Skirt.

The cover is installed on the frame with two elastic fasteners, the hinged lid is installed on the cover. The cover has a cover switch which stops operation immediately when the cover is removed.

The skirt is the rotating surface on the lower section of the vehicle. This device rotates and pushes the forage against the feed fence while the vehicle drives in a straight line along the feeding alley.

The technician removes the cover to do maintenance.

4.2.1.2 Carriage and Contra Weight

The carriage has:

- Frame
- Wheel support
- Front wheel.

The front wheel is a support wheel.

The frame is attached to a concrete contra weight. The contra weight weighs 335 kg (739 ft.) which makes sure the JUNO 150 has sufficient mass to push the forage. On top of the concrete contra weight a hoisting eye is installed.

4.2.1.3 Driving Mechanism

The drive motors, that are attached to plates on the contra weight, drive the two wheels on the side via chains and gear sets. The vehicle has no steering-wheel. Its direction is controlled by letting one of the motors run faster than the other.

The driving mechanism has the following parts:

- Drive motor (2×)
- Chain (2×)
- Gear set (2×)
- Wheel (left and right).

The drive motors get input from the ADS 3840 PCB.

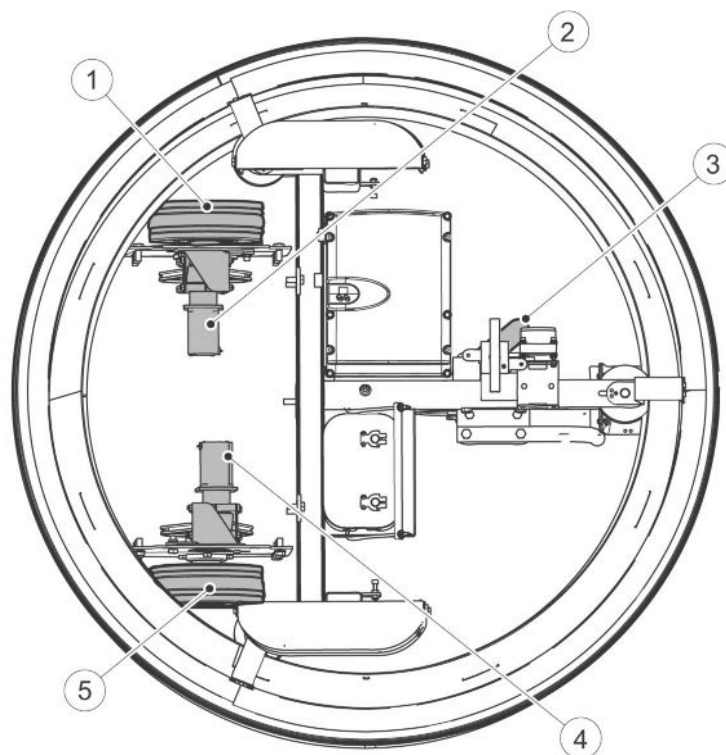


Figure 13. Driving mechanism (cover and concrete block removed)

KEY:

1. Left wheel - 2. Left motor - 3. Front wheel - 4. Right motor - 5. Right wheel - Gear sets and chains are not shown.

4.2.1.4 Power System

The power system stores and distributes the electrical power for the driving mechanism and the control system. The power supply is a single rechargeable 12 V battery. The battery has a battery stop to interrupt the power supply.

Charging takes place at the charging station. The charging process is controlled by the ADS 3840 PCB.

The power system has the following primary parts:

- Battery with battery stop
- Charging strips
- ADS 3840 PCB.

The ADS 3840 PCB has a ON and a OFF button to switch ON or OFF the JUNO 150 (page 6-4).

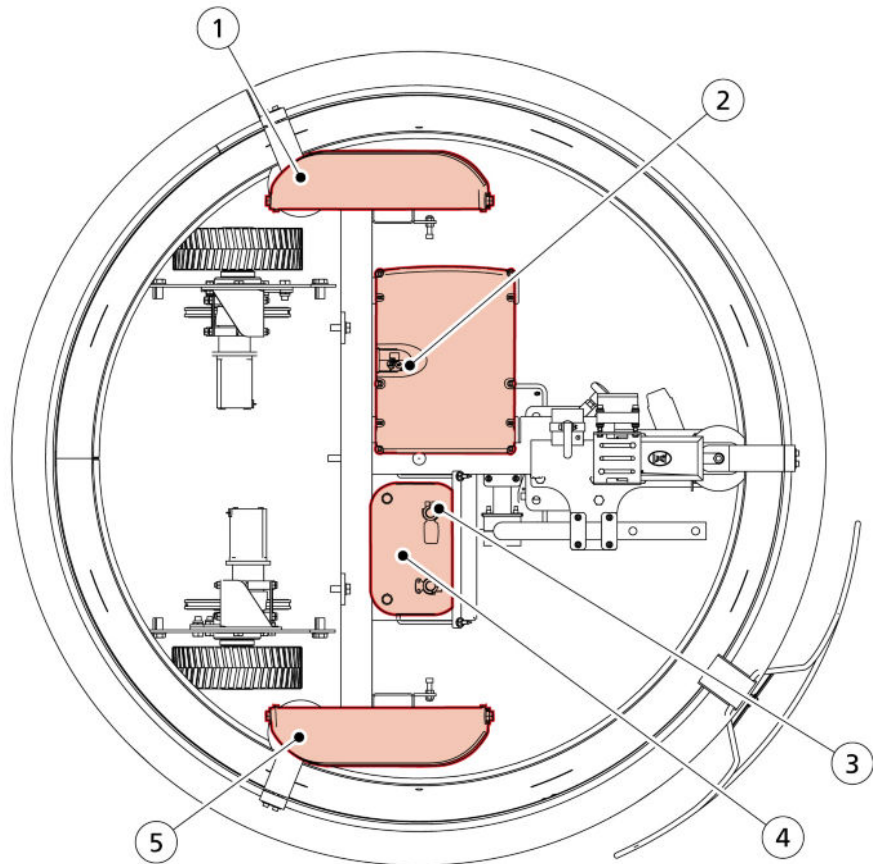


Figure 14. Power system (cover and contra weight removed)

KEY:

1. Charging strip - 2. PCB-box with ADS 3840 PCB and ON and OFF buttons - 3. Battery stop - 4. Battery - 5. Charging strip

4.2.1.5 Shock System



The maximum amount of energy the electric pulse of the protection ring transfers is 15 mJ (at 500R). This does not harm cows or humans.

The shock system makes sure the cows do not block the JUNO 150. The power energizer (2) generates the pulse in the protection ring (3). The pulse is only on when the vehicle drives a route.

The shock system has a power energizer.

The power energizer gets input from the ADS 3840 PCB and sends output to the protection ring.

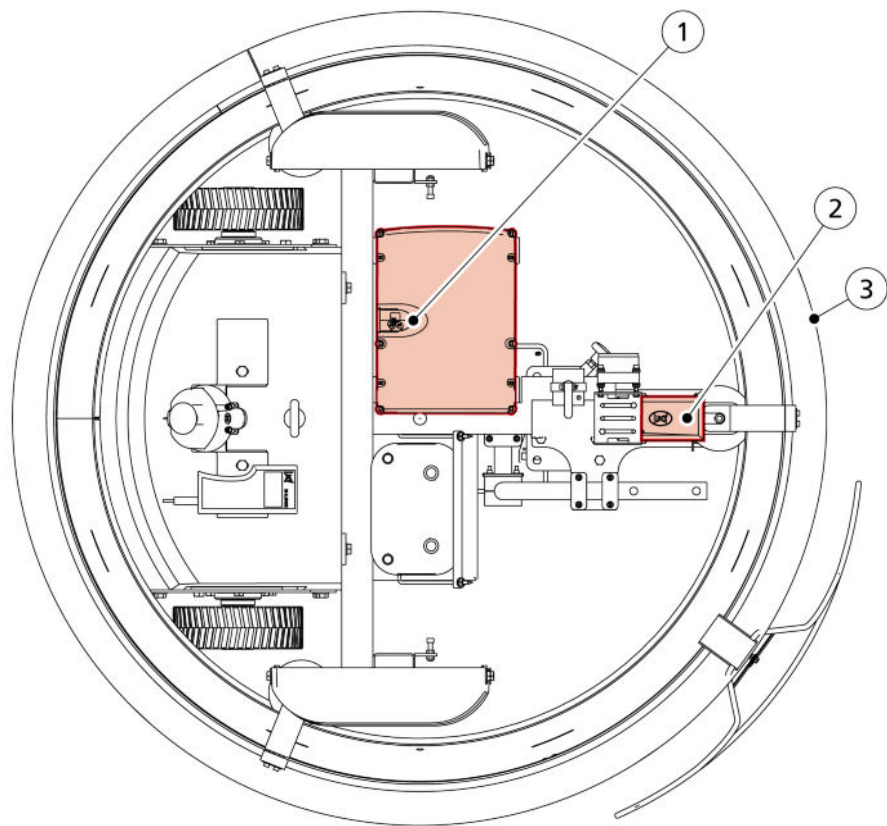


Figure 15. Shock system

KEY:

1. ADS 3840 PCB - 2. Power energizer - 3. Protection ring

5.4301.8501.0 - Lely Control

4.2.1.6 Safety System

The JUNO 150 has a safety system to (page 2-8):

- Protect people and animals against mechanical hazards by a set of interlocking safety devices that stop the JUNO 150 immediately when hit or opened:
 - Emergency stop button
 - Protection ring
 - Safety bracket
 - Interlocking lid.
- Warn people and animals by acoustic warning device
- Ensure that a fault in the hardware or software does not lead to hazardous situations:
 - Hardware safety protection
 - Software controlled charging system
 - Overload protection of the drive motors
 - Fused control system.
- Protect people during maintenance:
 - Sealed maintenance-free battery
 - Battery stop to disconnect the battery.

4.2.1.7 Control System

The control system has the following parts:

- ADS 3840 PCB
- Encoders
- Ultrasonic sensor
- Gyroscope (embedded on the ADS 3840 PCB)
- Inductive sensor.

All the parts work together to keep the JUNO 150 on the correct route.

Encoders

Each drive motor has an encoder that counts the rotation of the motor shaft. This information is used to calculate the position of the vehicle.

The encoders send outputs to the ADS 3840 PCB.

Ultrasonic Sensor

The ultrasonic sensor makes sure the JUNO 150 follows the wall or fence at a pre-determined distance.

A foam ring is attached to the sensor to minimize reflections and to focus the ray beam.

The sensor gets inputs from and sends outputs to the ADS 3840 PCB.

Gyroscope

The gyroscope measures the turning angle. This information is used to find the correct direction. The gyroscope is installed on the ADS 3840 PCB.

Inductive Sensor

The JUNO 150 has an inductive sensor device with two sensors to detect pre-installed metal strips along the feeding alley. This ensures accuracy of the programmed routes.

Lely Control app

The Lely Control app controls and monitors the JUNO 150 and communicates with the management software. The Lely Control app is available in the Google play store (Android).

The user interface of the Lely Control app displays nine buttons that enable the user to give commands and change values in the JUNO 150. The user interface also shows reports and alarms.

The Lely Control app communicates via bluetooth with the software on the ADS 3840 PCB.

The user interface has the following buttons:

-  Execute the command on the display above the applicable soft button.
- **[START/STOP]** starts or stops an action.
-  moves the selector up one item or increases a value by one.
-  moves the selector down one item or decreases a value by one.
-  opens the selected function or the next menu screen.
- **[ESC]** returns to the previous screen.
-  reduces the speed of the vehicle.

Acoustic signal

The Lely Control app gives an acoustic signal when:

- The JUNO 150 is in normal operation
- Settings are saved
- The calibration of the gyroscope is finished
- Backup is finished (create / restore)
- Programming a route

4.2.2 Charging Station

The charging station is the start and finishing point for all routes. The JUNO 150 can be left permanently connected to the charging station. This keeps the battery in good condition. The ADS 3840 PCB continuously examines the voltage of the battery. It is not possible to overcharge the battery.

The charging station has a 20 A electronic battery charger. The battery charger electrodes are at the front near the bottom of the charging station.

The charging station can be installed in the barn in two ways:

- wall-mounted
- floor-mounted.

If it is not possible to install the charging station to the wall, an optional floor column can be supplied.

Battery Charger

The 20 A electronic battery charger has two indicator LEDs on the upper right side. The meaning of the LEDs are:

Status	Charging LED (orange)	Power LED (green)
Mains connected	OFF	ON
Charging (>1A)	ON	ON
Error	blinking	blinking

4.3 User Interface

The JUNO 150 is operated with a smartphone with an Android operating system. The smartphone communicates with the software via bluetooth. The main menu on the smart phone has the following items:

- Work
- Routes
- Test
- Settings
- Alarms
- Service.

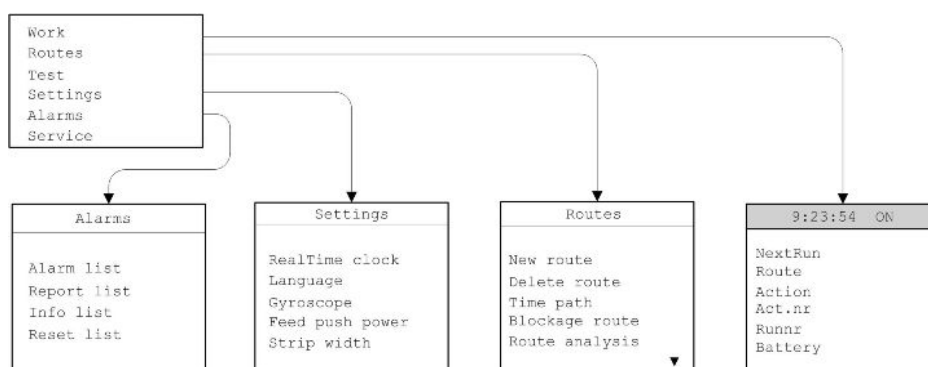


Figure 16. The Lely Control app menu structure

Buttons:

- [] or [] to select a menu item
- [] to confirm an action
- [ESC] to go to the previous menu.

4.3.1 Work

The menu 'Work' is used for daily operation of the JUNO 150. You can operate the JUNO 150 in automatic mode using a time path and in manual mode.

The menu 'Work' has the following submenu's:

- ON /OFF (to switch the time path ON or OFF)
- MANUAL ROUTE (to manually start a selected route)
- MANUAL DRIVING (to manually drive the JUNO 150)
- MANUAL CHARGER (to drive the JUNO 150 to the charging station, following the strip).

The button [] must be used to open next menu, [ESC] to open the previous menu. A black dot on the right side of the screen indicates the level. The highest level (ON/OFF) has for example a dot on the upper side, the lowest level (MANUAL CHARGER) a dot on the lower side.

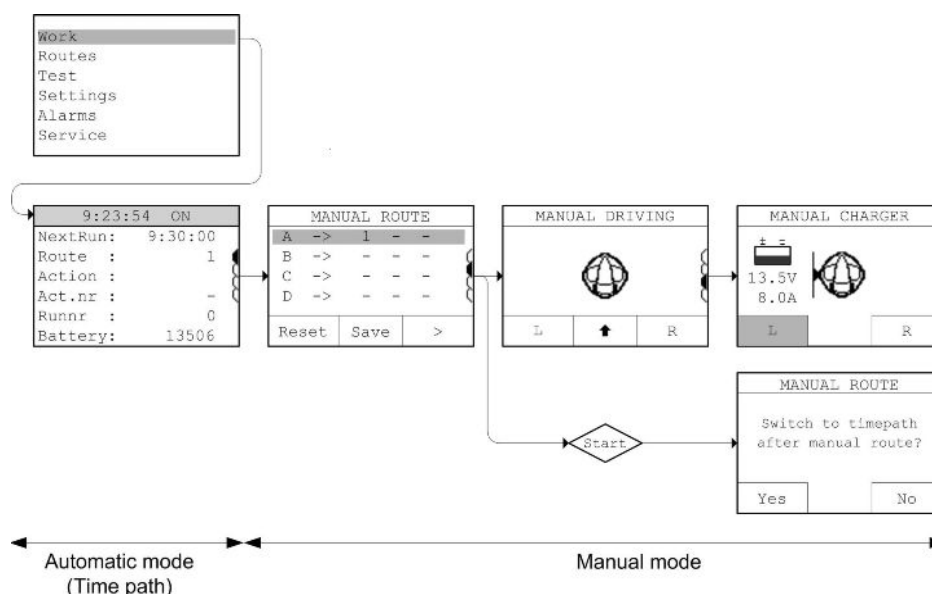


Figure 17. Menu Work

The level is indicated by a tab with a black dot on the right side of a display. There are four levels:

- Menu 'Work', indicated by the upper dot
- 'Manual route', indicated by the second dot
- 'MANUAL DRIVING', indicated by the third dot
- 'MANUAL CHARGER', indicated by the fourth dot.

4.3.1.1 Time Path ON/OFF



If the time path is switched ON, the upper pane is grayed out (see the following figure).

Display	Description
9:23:54 ON NextRun: 9:30:00 Route : 1 Action : Act.nr : - Runnr : 0 Battery: 13506	- Start or stop timed actions which are set in a time path - Display the status: - Actual time - ON or OFF - NextRun: start of the next route - Route: route number - Action: action description (visible during route) - Act.nr: sequence number for the action in this route - Runnr: run number - Battery: battery voltage.
9:23:54 OFF NextRun: 9:30:00 Route : 1 Action : Act.nr : - Runnr : 0 Battery: 13506	

Buttons:

- [START/STOP] to start or stop timed actions
- [↩] to go to the next menu
- [ESC] to go to the previous menu. Or

Push the pause button on the JUNO 150 to start or stop timed actions.

4.3.1.2 Manual Route



Driving manual route is only possible when the time path is switched OFF.

Display	Description
MANUAL ROUTE A -> 1 - - B -> 2 3 4 C -> - - - D -> - - - Reset Save >	Let the vehicle drive a series of maximum 3 subsequent routes

Buttons:

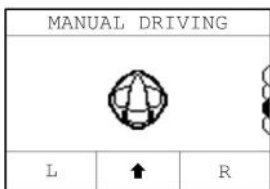
- [START/STOP] to start or stop the action
- [ESC] to go to the previous menu
- [↩] to go to the next menu

- Soft button [>] to select the first, second or third route in the series
- Button [] or [] to select the route number
- Soft button [Reset] to clear the set route(s)
- Soft button [Save] to save the set route. []

4.3.1.3 Manual Driving



Driving a manual route is only possible when the time path is switched OFF.

Display	Description
	• Move the vehicle manually (page 5-4)

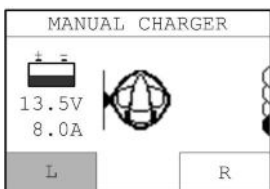
Buttons:

- [START/STOP] to start or stop the action
- [] to go to the next menu
- [ESC] to go to the previous menu
- Soft button [L] to turn right
- Soft button [R] to turn left
- [] to select the drive direction

4.3.1.4 Manual Charger



Driving manually to the charger is only possible when the time path is switched OFF.

Display	Description
	• Let the vehicle automatically drive to the charging station (starting within 1 m from the strip in front of the charging station) (page 5-5) • The values on the display indicate the battery voltage and the charge current.

Buttons:

- [START/STOP] to start or stop the action
- [↵] to go to the next menu
- [ESC] to go to the previous menu
- Soft buttons [L] and [R] to select the position of the charging station

4.3.2 Routes

The menu 'Routes' is used for programming routes or for test and adjustments.



Menu Routes

Buttons:

- [△] or [▽] to select a menu item
- [↵] to confirm an action
- [ESC] to go to the previous menu

New Route

A new route is built from the following actions:

- Strip follow
- Straight
- Turn R -->
- Turn L <--
- Feed push L
- Ultrasound L
- Charger strip
- Waiting time.

A route has a maximum of 125 actions.

Strip follow

Follow the guiding strip on the floor (page 4-1).

The display shows the following information:

Display	Description
Strip follow Actionnr : 0 RunDst : 0 Strip : 0 MAN	• Actionnr: sequence number for the action in this route • RunDst: distance travelled in mm • Strip: indicates 1 when above the strip

Buttons:

- **[START/STOP]** to start or stop
- Soft button **[MAN]** to adjust the position of the vehicle to get a good start position (direction).

Straight

Drive straight forward, only with the use of the gyroscope to correct the position.

The display shows the following information:

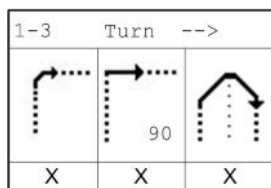
Display	Description
Straight Actionnr : 0 RunDst : 0 Gyro : 0.0 Speed : 0 ↑ MAN	• Actionnr: sequence number for the action in this route • RunDst: distance travelled in mm • Runnr: run number • Speed: speed in mm/s

Buttons:

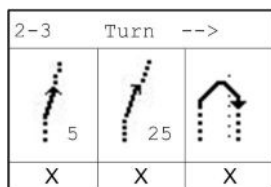
- **[START/STOP]** to start or stop
- Soft button **[MAN]** to adjust the position of the vehicle to get a good start position (direction)
- Soft button [**↑**] to change the direction.

Turn --> or <-- Turn

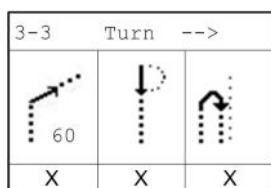
Turn right or left. You can choose from 9 standard turns to both right and left. The chosen turn can be adjusted according to the specific situation. The standard curves are:



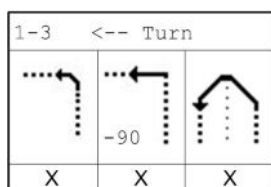
- Turn right 90 degrees, smoothly
- Turn right 90 degrees
- Turn right 180 degrees, stop in adjacent lane 100 cm (39.4 in) to the right.



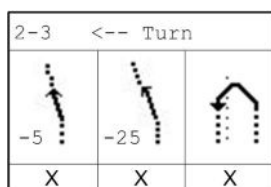
- Turn right 5 degrees
- Turn right 25 degrees
- Turn right 180 degrees, stop in adjacent lane 60 cm (23.6 in) to the right.



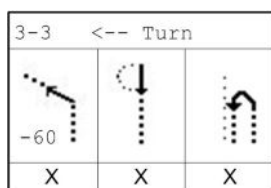
- Turn right 60 degrees
- Turn right 180 degrees
- Turn right 180 degrees, stop in the adjacent lane 30 cm (11.8 in) to the right.



- Turn left 90 degrees, smoothly
- Turn left 90 degrees
- Turn left 180 degrees, stop in adjacent lane 100 cm (39.4 in) to the left.



- Turn left 5 degrees
- Turn left 25 degrees
- Turn left 180 degrees, stop in adjacent lane 60 cm (23.6 in) to the left.



- Turn left 60 degrees
- Turn 180 degrees
- Turn left 180 degrees, stop in adjacent lane 30 cm (11.8 in) to the left.

After selecting an option, the variables of the turn can be adjusted. The display shows the following information:

Display	Description
Turn Actionnr : 2 Turn : 90 < Radius : 300 Back : 0 <	• Actionnr: sequence number for the action in this route • Angle of the turn, positive value (+) = turn right, negative value (-) = turn left • The radius of the turn the vehicle will make: 0 = on the spot, 300 = turn around one of the drive wheels • The distance (in mm.) the vehicle first goes back before making the turn (needed if the vehicle is near an obstacle).

Buttons:

- Soft button [<] to select the variable you want to modify
- Push [] or [] to adjust the value of the selected variable
- [START/STOP] to start or stop
- Soft button [MAN] to adjust the position of the vehicle.

i

The same description applies for turning to the left.

Feed push L

Tracking along a feed fence on the left at a certain distance. The ultrasonic sensor is used to measure the distance to the feed fence.

This function is like Ultrasound L, but the motor power is higher to assure that the vehicle has enough power to push the forage to the feed fence.

The display shows the following information:

Display	Description
Feed push L Actionnr : 0 RunDst : 0 UltraDst : 1026 ULTRADST : 1000 < MAN	• Actionnr: sequence number for the action in this route • RunDst: distance travelled in mm • UltraDst: actual distance to the wall or fence (mm) • ULTRADST: adjustable distance to the wall or fence (mm).

Buttons:

- [] or [] to modify the value of the selected variable
- [**START/STOP**] to start or stop
- Soft button [MAN] to adjust the position of the vehicle.

Ultrasound L

Tracking along a wall or fence on the left at a certain distance. The ultrasonic sensor is used to measure the distance to the wall or fence.

The display shows the following information:

Display	Description
Ultrasound L Actionr : 3 RunDst : 0 UltraDst: 856 ULTRADST: 1100 < MAN	• Actionr: sequence number for the action in this route • RunDst: distance travelled in mm • UltraDst: actual distance to the wall or fence (mm) • ULTRADST: adjustable distance to the wall or fence (mm).

Buttons:

- [] or [] to modify the value of the selected variable
- [**START/STOP**] to start or stop
- Soft button [MAN] to adjust the position of the vehicle.

Charger strip

Drive the vehicle back to the charging station. The JUNO 150 follows the metal strip on the floor and finds the charging station independently (default = on the left) (page 4-1). The vehicles nose must be placed within 1 m (39.4 in) before the strip into the direction of the charging station.

The display shows the following information:

Display	Description
Charger strip Actionr : 0 RunDst : 0 Strip : 0 L MAN	• Actionr: sequence number for the action in this route • RunDst: distance travelled in mm • Strip: indicates 1 when above the strip.

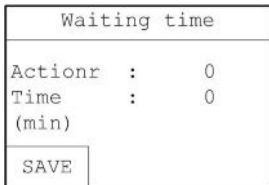
Buttons:

- Soft button [L] to modify the position of the charging station
- Soft button [MAN] to adjust the position of the vehicle
- [START/STOP] to start or stop.

Waiting time

Wait an adjustable time before continuing with the next action in a route (page 5-9). This action can be used in route that moves the vehicle out of the feeding alley, keeps the vehicle waiting, and returns the vehicle to the charging station when the work is done (for example bringing new forage into the feeding alley).

The display shows the following information:

Display	Description
	• Actionnr: sequence number for the action in this route • time : (min) Waiting time.

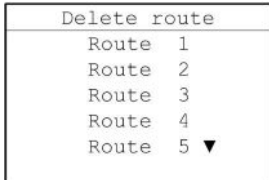
Buttons:

- [] or [] to modify the value of the selected variable
- [START/STOP] to start or stop
- Soft button [Save] to save the setting.

4.3.2.1 Delete Route

The menu 'Delete route' is used to delete an existing route.

The display shows the following information:

Display	Description
	• List of set routes.

Buttons:

- [] or [] to select a route
- [] to confirm.

4.3.2.2 Time Path

It is useful to combine routes into a 'Time path'. If the time path is switched ON the JUNO 150 drives the set routes automatically at the set times each day (page 5-13). A time path lasts maximum 24 hours. A time path has 48 time/route combinations maximum, made up of 16 different routes maximum.

The display shows the following information:

Display	Description
hour minroute 12:00 -> 1 14:00 -> - 16:00 -> 1 18:00 -> 2 ▼ DelNew>	- Time path: start times of set routes - Route: number of the route.

Buttons:

- [▲] or [▼] to select a route in the time path
- Soft button [Del] to delete a timed route from the time path
- Soft button [New] to add a new timed route to the time path
- Soft button [>] to select the next variable.

Example:

- Route 1 - push the forage 2 m from the feed fence
- Route 2 - push the forage 1.8 m from the feed fence
- Route 3 - push the forage 1.6 m from the feed fence
- Route 4 - push the forage 1.4 m from the feed fence.



Measurements are from the ultrasonic sensor to the feed fence.

The following example time path is based on these routes, with the assumption that the farmer feeds at 10:00:

Time	Route
12:00	1
14:00	1
16:00	1
18:00	2
20:00	2
22:00	2
0:00	3

2:00	3
4:00	4
6:00	4

4.3.2.3 Blockage Route

The menu 'Blockage route' is used to temporally block one or more routes. If you do not want the vehicle to drive within a particular distance from the feed fence, block the routes that have that distance. Blocked routes will be ignored by the time path.

4.3.2.4 Route Analysis

The menu 'Route analysis' has the following options:

- Fail. problyt
- Failure analys.

'Fail. problyt' gives a quick overview of the reliability per route. 'Failure analys' gives detailed information and shows per route the action numbers have a high risk of failure. It also gives an indication of the fault.

Failure Probability per Route

The display 'Fail. problyt' displays for each route, numbered from 1 - 16, the probability of a failure on a scale from 0 - 5. In the next figure route 1 has a low risk and route 4 a very high risk.

1-2 Failures/route								
5								
3								
1								
	1	2	3	4	5	6	7	8

- If a routes has a failure probability of more than 2, the risk of failures is too high.

Buttons:

- [- [ESC] to go one level up.

Failure Analysis

The display 'Failure analysis' has 2 tables:

- The table Failure analysis displays per fault category (A - H) the action numbers that causes a risk
- The second table displays explanations.

	Display text	Explanation	
A	Bend in action	Very unreliable route due to a combination of factors (B-J)	
B	Start-Resetp. angle	Angle of more than 20 degrees between the start and the reset point. This could be due to an angled start point	
C	Resetp.-End angle	Angle of more than 15 degrees between the reset point and the end point. The vehicle goes in the wrong direction before it reaches the end point. This could be due to an obstacle	
D	Angle betw. Actions	Vehicle has unexpectedly turned after saving an action, causing the next action to start in a different direction	
E	Drift/bend action	Vehicle is forced to make a bend during an action (wall follow or ultrasound drive) less than 1.5 m (4.9 ft) after the start of the action	
F	Drift/angled start	Vehicle starts angled due to, for instance angled ending of the previous action	
G	Angled ending	Vehicle ends action angled (>10 degrees) due to for instance a collision	
H	Straight > 5 m	Deviation caused by driving straight for more than 5 m (15.4 ft)	
I	No strip	No strip detected, or strip length too short	
J	Strip too short	Distance to strip too short	

4.3.2.5 Beepfreq Route

This menu is used to set the beep frequency during the driving. The default frequency is every 2 seconds. The frequency can be set for each route separately. The display displays the value per second, so 0.5 equals one beep per two seconds.

4.3.2.6 Copy Route

The menu 'Copy route' is used to copy a route. The copied route can be modified to make a new route.

4.3.2.7 Modify Route

The menu 'Modify route' is used to modify parts of an existing route. Since a route is built of many actions, changing one action influences the rest of the route. Therefore modification is restricted to:

- Modify the run distance
- Modify the angle of a turn
- Add waiting time
- Modify the feed push ultrasound distance
- Modify the ultrasound distance.

4.3.2.8 Backup Route

This menu is used to make a backup with the Lely Control app on the smartphone or to restore the information on the ADS 3840 PCB.

4.3.2.9 Feed Groups

The menu 'Feed groups' is used to define the feed groups.

You can link a feed push action, the full action or a part of it, to a feed group. A push power is set for each feed group.

A feed group can only be assigned to feed push actions. It is possible to use the same feed group for more than one action.

4.3.2.10 Push Power Feed Groups

The menu 'Pushpwr feedgr' is used to define the push power for the feed for a feed group. There are four levels of push power: high, average, low and extra low.

4.3.3 Settings

RealTime clock

The menu RealTime clock is used to set the date and time of the JUNO 150. The correct date setting is also important to search for alert reports on a date.

Date 02-09-2008 (dd/mm/yyyy)

Time 16:53:23 (24h format, hr/min/sec)

Language

The menu Language is used to modify the language of the user interface

Gyroscope

The menu 'Gyroscope' is used to recalibrate the gyroscope. The JUNO 150 must not be moved during the calibration.

4.3.3.1 Feed Push Power

Feed push power

The menu 'Feed push power' is used to modify the force of the JUNO 150. The menu has two sub menus:

- Motor power
- Auto feed push.

Motor power

The menu 'Motor power' is used to set a constant power. There are four settings:

- High
- Medium
- Low
- Extra low.

Auto feed push

The menu 'Auto feed push' is used to switch 'On' or 'Off' dynamic feed push power. When 'Auto feed push' is switched 'On' the power is not constant but depends on the counter-pressure of the feed. There are four settings:

- High
- Medium
- Low
- Extra low.

Strip width

Select the correct strip width:

- 50 mm (2.0 in)
- 70 mm (2.8 in)
- 90 mm (3.5 in).

The correct strip width for the JUNO 150 is 90 mm.

Inductor height

Set the distance between the inductive sensor and the strip. The distance between the inductive sensor and the strip must be minimum 10 mm (0.4 in).

Reset point

Set the sensitivity of the induction sensor to detect a reset point. There are three settings:

- High
- Medium
- Low.

Beep length

The menu Beep length is used to set the duration of the beep. The default length is 200 mSec. This setting is for all routes.

Reset report

This menu 'Reset report' resets the service information data (service technicians only).

Wheel diameter

Set the wheel diameter. The default value is 250 mm (9.8 in).

4.3.4 Alarms

The JUNO 150 monitors itself continuously and informs you about the situation. The JUNO 150 generates alarms and reports.

Alarm List

The Alarm List gives a summary of the alarms received. This list stores up to 250 alarms (page 8-1). When 250 alarms are stored, the next alarm overwrites the oldest alarm on the list.

Report list

The Report list gives a summary of the generated reports.

Info list

The Info list gives technical details. It is used by the service technician.

Reset list

The menu Reset list is used to delete all alarm, report and info information.

4.3.5 Service

The menu Service has the following submenus:

- Hour counter to display the hours in use since the last counter reset (only used by a service technician)
- Version to display the software version
- Installation 1 to install and test the JUNO 150 (only used by a service technician)
- Installation 2 to install and test the JUNO 150 (for development purposes only)
- Test Service to test the JUNO 150 (for development purposes only).

4.4 Operation

4.4.1 Routes, Actions, Manual Routes and Time Paths

Actions make a route

The JUNO 150 drives through a barn along a programmed route. A route is built up of actions like 'Strip follow' or 'Turn L <--'. A route always starts and ends at the charging station. Refer to the following example figure (see figure on page 4-24).

Automatic feed pushing with a time path

The JUNO 150 pushes the feed each day automatically on the same time if a time path is set.

Manual feed pushing with manual routes

It is useful to enable 'MANUAL ROUTE'. You then can push a part of the feed whenever you want to test a route (page 4-11). It is also useful to program routes from different points in the barn back to the charging station.

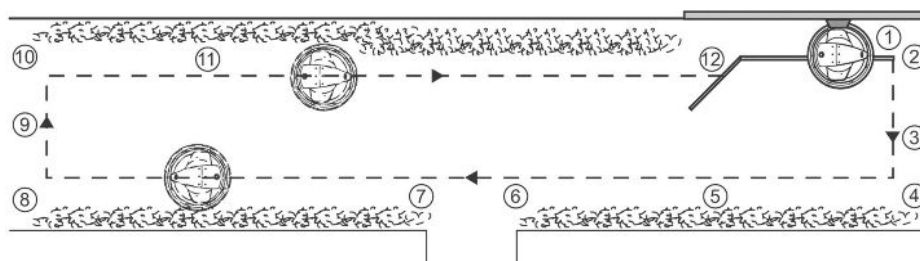


Figure 18. Actions make a route

KEY:

1. Strip follow - 2. Turn R --> - 3. Straight - 4. Turn R --> - 5. Feed push L - 6. Straight - 7. Feed push L - 8. Turn R --> - 9. Straight - 10. Turn R --> - 11. Feed push L - 12. Charger strip

4.4.2 Control System

The control system keeps the vehicle on the correct route. Two sensors on the bottom detect the metal striping on the floor. The built-in ultrasonic sensor makes sure that the JUNO 150 follows a wall or feed fence at a pre-determined distance. An electronic gyroscope guides the JUNO 150 in the correct direction when a turn is programmed.

Driving distance

The encoders on the drive motor shafts measure the number of revolutions of the motors. This value is used to calculate the travelled distance. If, due to slip, the actual driving distance is less than calculated it will be corrected the next time. It can only be corrected if the action ends at a reset point (a strip on the floor of the feed alley).

Speed

The number of revolutions is also used to calculate the speed. The speed is constant.

Distance to a wall or fence

The ultrasonic sensor sends a pulsed ultrasound wave at the object and then measures the time for the sound echo to return. Knowing the speed of sound, the sensor can determine the distance of the JUNO 150 to a wall or other object. The ADS 3840 PCB sends output to the drive motors to correct the distance.

Angle

When the JUNO 150 turns, the gyroscope measures the turning angle. This value is used to stop the vehicle turning. The turning angle may be inaccurate if the gyroscope is not reset before starting the turn. The gyroscope is reset each time the JUNO 150 drives a few meters in the same direction.

Obstacles

The JUNO 150 has a rubber ring with a collision detector (see figure on page 2-11) that stops the vehicle immediately when the vehicle hits an object that is at least 60 cm above floor level. The reaction of the JUNO 150 depends on the object type.

- If the vehicle hits a solid object (for instance a tractor), the JUNO 150 drives back until there is no contact with the obstacle. The vehicle tries to continue its route. If it hits the object again, it drives back again (until there is no contact), stops and generates an alarm message.
- If the vehicle hits an object that is not solid, or if a cow bites the ring, the vehicle waits a moment and tries to continue its route. If the collision detector is activated some more times, the vehicle stops and generates an alarm message.

The collision detector has a pulse on it while the JUNO 150 is driving a route.



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5. OPERATING INSTRUCTIONS



Do not sit on the vehicle



Keep safe distance



Only persons who have read and understood all applicable safety instructions are permitted to enter the area.



Only operate the JUNO 150 with the safety bar installed on the front.



Electric shock.

Keep away from the collision detector during operation of the JUNO 150.

5.1 Install or Update the Lely Control app on Your Smart Phone

1. On the smartphone go to the Google play store.
2. Download the Lely Control app.
3. Install the app.
4. Wait until the software is correctly installed.
5. The first time you start to control the JUNO 150 with the software on the smartphone, you must enter a password for the JUNO 150 system. Ask your local Lely service provider for the password.



If there is new software available, a notification is displayed on the icon of the Google play store.

5.2 Rename the JUNO 150 on the Smartphone



The device name of the JUNO 150 that is displayed on the smartphone can only be modified by a certified Lely technician.

5.3 Set the farmer password



The farmer password must be set by a certified Lely technician.

It is recommended to use the same password for all smartphone controlled machines on a farm.

5.4 Open or Close the Lid



The JUNO 150 stops immediately when the lid is opened.

1. Open or close the lid (see figure on page 5-2) (1).

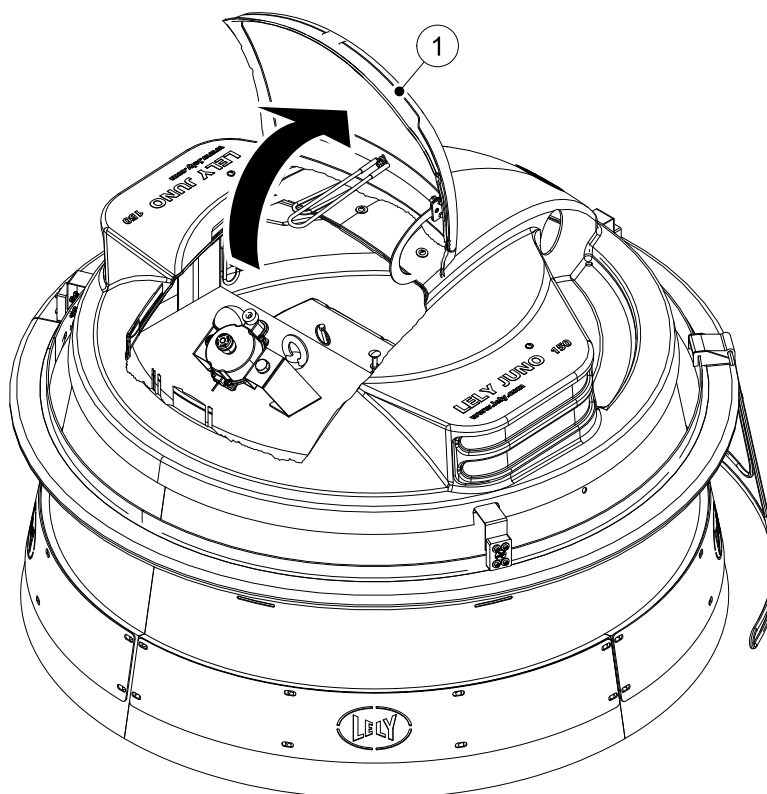


Figure 19. Open the lid

5.5 Switch ON or OFF the JUNO 150



The JUNO 150 does not need to be switched OFF during normal operation.

To switch ON

1. Open the lid.
2. On the pcb box, push button **[ON]** to switch ON the JUNO 150.
3. Close the lid.

To switch OFF

4. Open the lid.
5. On the pcb box, push button **[OFF]** to switch OFF the JUNO 150.
6. Close the lid.

5.6 Operate Device Specific Software with a Smartphone

Connect the Smartphone

1. Make sure the App is installed on your smartphone.
2. Make sure the JUNO 150 is in your line of sight before you start the software.
3. Start the software on your smartphone (page 5-3).

Disconnect the Smartphone

1. Stop the software on your smartphone.

5.7 Start the Software on Your Smartphone



Remote Operation of the smartphone or tablet by remote desktop software (such as, but not limited by, Teamviewer) is strictly forbidden to avoid dangerous situations.



Make sure the machine is in your line of sight.



Make sure you are in the vicinity of the JUNO 150 when you want to connect the phone to the machine. If the distance is too big, it will not appear in the list on the smartphone display.



The device name of the JUNO 150 that is displayed on the smartphone can only be modified by a certified Lely technician.



Sometimes the phone must be paired with the JUNO 150 before you can do the procedure below.



The JUNO 150 can not be connected to more than 1 smartphone simultaneously.

On the Smartphone:

1. Start the Lely Control app.
2. If bluetooth was not in operation the following question (or similar) appears: 'The application tries to switch on bluetooth, continue?'
3. Push 'Yes'.
4. Push the line: 'Search for devices'. The devices near the smartphone will be found. If one or more devices are not found, repeat this step.
5. Push the line with the machine you want to operate. A connection will be made with the selected machine. A green light is displayed in the title when the connection is made. The smartphone shows a set of control buttons and a display that can be used to operate the software. If the smartphone loses connection the green light turns red. Move towards the machine and make the connection again.
6. Push 
7. If the JUNO 150 was switched OFF, Calibrate the gyroscope.

In general the buttons have the following function:

- [] Execute the command on the display above the applicable soft button.
- [START/STOP] starts or stops an action.
- [] moves the selector up one item or increases a value by one.
- [] moves the selector down one item or decreases a value by one.
- [] opens the selected function or the next menu screen.
- [ESC] returns to the previous screen.
- [] reduces the speed of the vehicle.

5.8 Manually Drive the JUNO 150

1. Stop all timed actions (page 5-14).
2. Push [] twice to select the menu 'Manual driving'.
3. The message 'SAFETY WARNING. Manual operation is permitted only with a clear overview of the vehicle. Confirm?' appears on the smartphone display.
4. Confirm if you have a clear overview of the JUNO 150.
5. In the menu 'Manual driving', push:
 - [L] to turn right, or
 - [R] to turn left, or
 - [L] and [R] to go straight on.
6. Push [] to change the direction, if necessary.
7. Push [START/STOP] to start, hold it.
8. Release [START/STOP] to stop.

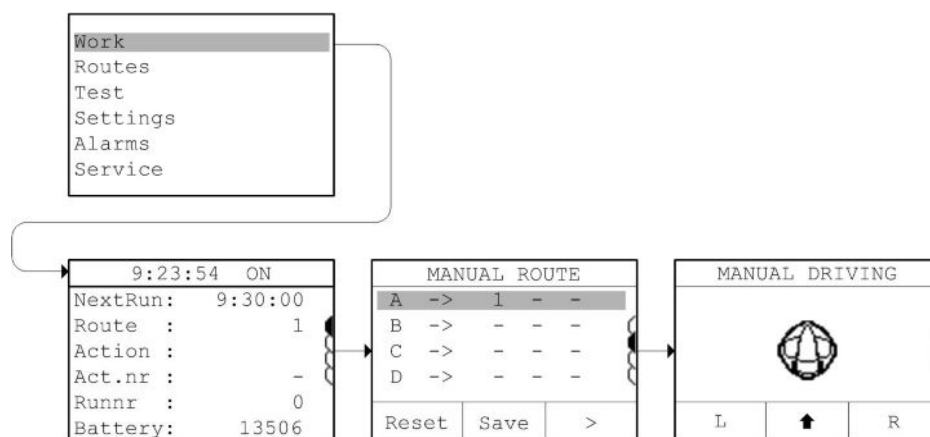


Figure 20. Manual driving

5.9 Drive the JUNO 150 to the Charging Station

1. Stop all timed actions (page 5-14).
2. Manually drive (page 5-4) the JUNO 150 to 0.5 m (2 ft.) or less from the strip (page 5-4).
3. Make sure the front of the vehicle points in the direction of the charging station.
4. Push [] to select the menu 'Manual Charger'.
5. In the menu 'Manual Charger', push:
 1. [L] if the charging station is on the left side
 2. [R] if the charging station is on the right side.
6. Push [START/STOP] to start.



The JUNO 150 approaches the charging station and stops by itself.

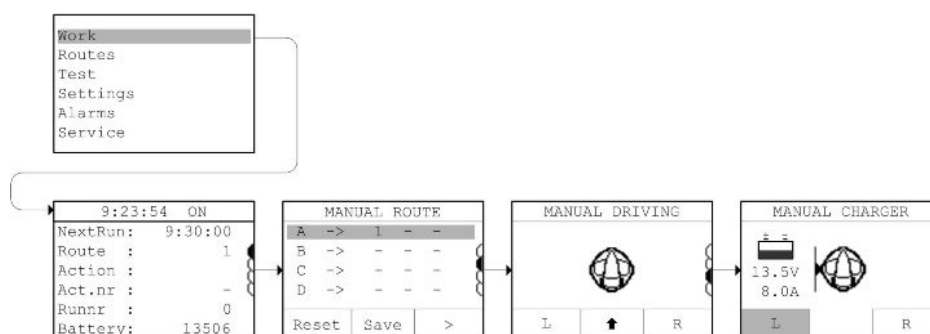


Figure 21. Drive to the charging station

5.10 Prepare for Programming

5.10.1 Requirements for a Good Route

Make it possible for the JUNO 150 to correct itself

- Remove feed and obstacles from the feed alley when programming a route. This enables the JUNO 150 to return to the 'ideal' route when it is forced to deviate from the route when pushing feed.
- Be aware that actions like 'turn' and 'straight' may cause inaccurate results. Make sure the vehicle cannot get stuck after making a turn or driving straight. Program a 'long action' ('strip follow' or 'ultrasound') after a 'short action' ('turn' or 'straight').

Make it easy for yourself

- Program routes from different positions in the barn back to the charging station. This will enable you to easily return the vehicle back to the charging station in case it gets lost.
- Make a backup after programming a route.

5.11 Program the JUNO 150

5.11.1 Program a New Route

Preparation

1. Make sure you understand the requirements for setting up a good route.
2. Plan the route.
3. Open the Lely Control app on the smartphone.
4. Stop all timed actions (page 5-14).

Program

5. In the main menu of the Lely Control app, select 'Routes' and push [↩].
6. Select the menu 'New route' and push [↩].
7. The message 'SAFETY WARNING. Manual operation is permitted only with a clear overview of the vehicle. Confirm?' appears on the smartphone display.
8. Confirm if you have a clear overview of the JUNO 150.



If the vehicle is not connected to the charging station, you can push soft button [CHARGE] to drive the JUNO 150 to the charging station (page 5-4).

9. Push soft button [START].
10. Read the messages on the display and push [↩].
11. Program the first action ('Strip follow').
12. Program one of the next actions in the route:
 - Strip follow (page 5-7)
 - Straight (page 5-7)
 - Turn R --> (page 5-7)
 - Turn L <-- (page 5-7)
 - Feed push L
 - Ultrasound L (page 5-9)
 - Charger strip (page 5-9)
 - Waiting time (page 5-9).



The actions are explained in the next section.

13. If the vehicle has returned to the strip in front of the charging station, go to the charging station (page 5-5), Else repeat step 6.
14. Push soft button [Exit].
15. Push soft button [Yes] to save the new route.

Close-up

16. Test the route.

5.11.1.1 Follow the Strip on the Floor

1. Make sure the front of the vehicle is above the metal strip on the floor.
2. Select the menu 'Strip follow' and push [].
3. Push [**START/STOP**] to start.
The vehicle automatically stops at the end of the strip.
4. If you want the vehicle to stop, push [**START/STOP**].
5. Push soft button [**Save**].

5.11.1.2 Go Straight



Before starting, make sure the JUNO 150 points in the correct direction. Use the 'Straight' option as little as possible. If it really is necessary, for example to pass the JUNO 150 across the feed alley, make the distance travelled as short as possible. Continue with 'Ultrasound L'. This improves the accuracy of the route that is travelled.

1. Select 'Straight' and push [].
2. Push [**START/STOP**] to start.
3. If you want the vehicle to stop, push [**START/STOP**].
4. Push soft button [**MAN**] to modify the position.
 1. Push soft button [] to turn left, or [] to turn right.
 2. Push [**ESC**] to confirm and go one level up.
5. Push soft button [**Save**].

5.11.1.3 Turn Left or Right

1. If you want to turn left, select 'Turn L <--' and push [].
2. If you want to turn right, select 'Turn R -->' and push [].
3. Read the message on the display and push [].



You can choose from 9 standard turns and modify the turn afterwards.

4. Push [- 5. Select one of the standard turns with the appropriate soft button.
- 6. If you want to modify the turn, push [- 7. If you want to drive back before making a turn:
 1. Push soft button [ - 2. Push [
- 8. Push [START/STOP] to start.



If the resulting turn is not exactly as planned, modify the position (see the next step). This is especially important if the angle is 90 or 180 degrees left or right.

9. Push soft button [MAN] to modify the position.
 1. Push soft button [ - 2. Push [ESC] to confirm and go one level up.
10. Push soft button [Save].

5.11.1.4 Feed Push L



Do not program 'Feed push L' when the fence is more than 2.5 meter (8.2 ft) away.

1. Select the menu 'Feed push L' and push [- 2. Read the actual distance to the fence ('UltraDst') from the display.
- 3. Push [- 4. Push [START/STOP] to start.
- 5. If you want the vehicle to stop, push [START/STOP].
- 6. Push soft button [MAN] to modify the position.
 1. Push soft button [ - 2. Push [ESC] to confirm and go one level up.
- 7. Push soft button [Save].

5.11.1.5 Follow a Wall or Fence on a Certain Distance (Ultrasound)



Do not program 'Ultrasound L' when the wall is more than 2 meters away.
Do not use this action to push feed.

1. Select the menu 'Ultrasound Land push[←]
2. Read the actual distance to the wall (UltraDst) from the display.
3. Push [△] or [▽] to select the required distance to the wall (ULTRADST).
4. Push [START/STOP] to start.
5. If you want the vehicle to stop, push [START/STOP].
6. Push soft button [MAN] to modify the position.
 1. Push soft button [↶] to turn left, or [↷] to turn right.
 2. Push [ESC] to confirm and go one level up.
7. Push soft button [Save].

5.11.1.6 Go to the Charging Station following the Strip

1. Make sure the front of the vehicle is within 0.5 m (19.7 in.) from the strip leading to the charging station, and pointing towards the strip (page 5-4).
2. Select the menu 'Charger strip'.
3. Push soft button [MAN] to modify the position.
 1. Push soft button [↶] to turn left, or [↷] to turn right.
 2. Push [ESC] to confirm and go one level up.
4. If the charging station is on the right, push soft button [L].
5. Push [START/STOP] to start.



The JUNO 150 approaches the charging station and stops by itself.

5.11.1.7 Waiting Time

1. Select the menu 'Waiting time'.
2. Push[△]or [▽] to select the waiting time.
3. Push soft button [Save].

5.11.2 Copy a Route

1. Open (page 5-3) the Lely Control app on the smartphone
2. Stop all timed actions (page 5-14).
3. In the main menu of the Lely Control app, select 'Routes' and push [].
4. Select 'Copy route' and push [].
5. Select the route you want to copy and push [].
6. Push soft button [Yes] to confirm.

5.11.3 Modify a Route

1. Open (page 5-3) the Lely Control app on the smartphone
2. Stop all timed actions (page 5-14).
3. Test the route.
4. In the main menu of the Lely Control app, select 'Routes' and push [].
5. Select 'Modify route' and push [].
6. Select 'Modify route' and push [].
7. Select the route you want to modify and push [].
8. Read the message and make sure to understand it.
9. Select the action you want to modify and push [].
10. If you want to add extra waiting time before the action:
 1. Select the action.
 2. Push soft button [New].
 3. Select 'Waiting time' and push [].
 4. Modify the waiting time with [] or [].
11. If you want to modify the driving distance or the turn:
 1. Select the action and push [].
 2. Select the property you want to modify with soft button [].
 3. Modify the value of the property with [] or [].
12. Push [ESC] to confirm and go one level up.
13. Push soft button [Yes] to confirm.

5.11.4 Reset a modified Route to the previous Version

1. Open (page 5-3) the Lely Control app on the smartphone
2. Stop all timed actions (page 5-14).
3. In the main menu of the Lely Control app, select 'Routes' and push [].

4. Select 'Modify route' and push [].
5. Select 'Modify reset' and push [].
6. Select the route you want to reset and push [].
7. Push soft button Yes to confirm.

5.11.5 Delete a Route

1. Open (page 5-3) the Lely Control app on the smartphone
2. Stop all timed actions (page 5-14).
3. In the main menu of the Lely Control app, select 'Routes' and push [].
4. Select 'Delete route' and push [].
5. Select the route you want to delete and push [].
6. Push soft button [Yes] to confirm.

5.11.6 Set or Delete a Manual Route



Set a manual route to manually drive (a set of) route(s) or to test a route (page 4-11).

1. Open (page 5-3) the Lely Control app on the smartphone
2. Stop all timed actions (page 5-14).
3. In the main menu of the Lely Control app, select 'Work' and push [].
4. Push [] to select the menu 'Manual route'.

Set a Series of Routes

5. In the menu 'Manual route', push [] to select the series of routes you want to set (A, B, C or D).
6. Push soft button [>] to select the first route in the series.
7. Push [] or [] to select the route number.
8. Repeat step 6 and 7 to select the next route in the series (if applicable).
9. Push soft button [>] twice.
10. Push [Save] to save the series of manual routes.

Delete a Manual Route

11. Push [] or [] to select the route you want to delete.
12. Push soft button [Reset].

5.11.7 Define Feed Groups

1. Open (page 5-3) the Lely Control app on the smartphone
2. Stop all timed actions (page 5-14).
3. In the main menu of the Lely Control app, select 'Routes' and push [].
4. Select 'Feed groups' and push [].
5. Select the route and push [].
6. Select the feed push action you want to define a feed group to.
7. Select soft button [>]. 'Default' starts to blink.
8. Use buttons [] or [] to select the feed group and push soft button [>].



Up to 20 feed groups can be used.

9. To use the full length of the push action for this feed group, push [].
10. To use more than one feed groups for the feed push action:
 1. Push soft button [>].
 2. Use button [] and [] to change the length of the feed group and push soft button [>].
 3. When you push soft button [SAVE], a new default row is added with the remaining distance.
 4. Select soft button [>]. 'Default' starts to blink.
 5. Use buttons [] or [] to select the feed group and push soft button [>].
 6. Do the previous steps if you want to add another feed group to this feed push action.



The total length of the feed groups must be equal to the length of the feed push action.

11. Push [ESC] and push soft button [...save...].

5.11.8 Define the Push Power for a Feed Group

1. Open (page 5-3) the Lely Control app on the smartphone
2. Stop all timed actions (page 5-14).
3. In the main menu of the Lely Control app, select 'Routes' and push [].

4. Select 'Feed push power' and push [↵].
5. Select the applicable feed group and push [↵].
6. Select the applicable push power and push [↵].
7. Push button [ESC].

5.11.9 Set a Time Path

1. Open (page 5-3) the Lely Control app on the smartphone
2. Stop all timed actions (page 5-14).
3. In the main menu of the Lely Control app, select 'Routes' and push [↵].
4. Select 'time path' and push [↵].
Refer to the time path description.



The JUNO 150 must not drive more than 40% of the total time in a time path. It must spend minimum 60% of the total time charging at the charging station.

5. Push soft button **[New]**.
6. Push soft button **[>]**.
7. Push [△] to select the start time (hour) and push soft button **[>]**.
8. Push [△] to select the start time (minutes) and push soft button **[>]**.
9. Push [△] to select the route and push soft button **[>]**.
10. If you want:
 - To add another route to the time path, push soft button **[New]** and repeat steps 7 to 11
 - Confirm an go up one level, push **[ESC]**.
11. Push soft button **[Yes]** to save the new time path.

5.11.10 Make a Backup



Make a backup each time you change a route or time path or when another smartphone is used. Backups are made on the smartphone.



Make sure to give each backup you make a unique name.



Make sure the phone has a proper connection with the JUNO 150 and has enough storage space available for the backup file.

To make a Backup

1. Stop all timed actions (page 5-14).
2. In the main menu of the Lely Control app, select 'Routes' and push [↩].
3. Select 'Backup route' and push [↩]. The question 'Backup or restore the current routes and settings?' appears on the display of the smartphone.
4. Push soft button [Backup]. The software asks if you want to make a backup on the smartphone.
5. Push soft button [Yes]. The smartphone displays a progress bar of the backup process.
6. Enter the name for the backup file.
7. Push soft button [OK]
8. Wait until the process ends with a beep.

5.11.11 Copy a Backup file from the Smartphone to a PC

1. Connect the smartphone to a usb port of the PC. Use the data cable of the smartphone to connect.
2. Use the PC to browse to the Lely backup folder on the smartphone.
3. Select the applicable backup file (.bkp).
4. Copy the backup file from the smartphone.
5. Paste the backup file to the pc.

5.11.12 Copy a Backup file from a PC to the Smartphone

1. Connect the smartphone to a usb port of the PC. Use the data cable of the smartphone to connect.
2. Use the PC to browse to the location of the backup file (.bkp).
3. Copy the backup file from the PC.
4. Paste the backup file to the Lely backup folder on the smartphone.

5.12 Start or Stop Timed Actions



Remote Operation of the smartphone or tablet by remote desktop software (such as, but not limited by, Teamviewer) is strictly forbidden to avoid dangerous situations.

1. Open (page 5-3) the Lely Control app on the smartphone
2. In the main menu of the Lely Control app, select 'Work' and push [↩].



If the pane on the upper side of the menu, that displays the actual time, is grayed out, the timed actions are ON.

3. Push [START/STOP]. Or
4. Push the pause button on the JUNO 150 to start/stop the timed actions of the JUNO 150.

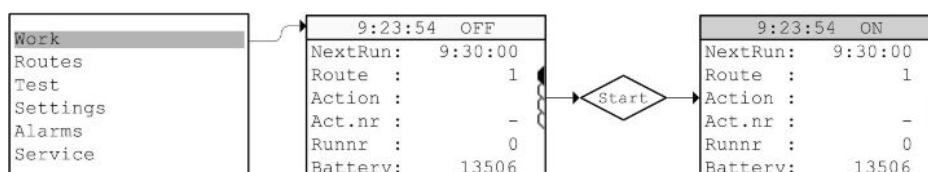


Figure 22. Start or stop timed actions

5.13 Start, Stop or Pause a Manual Route



Remote Operation of the smartphone or tablet by remote desktop software (such as, but not limited by, Teamviewer) is strictly forbidden to avoid dangerous situations.

To start a manual route:

1. Stop all timed actions (page 5-14).
2. In the main menu of the Lely Control app, select 'Work' and push [↩].
3. Push [↩] to select the menu 'Manual route'.
4. Push [▽] to select the series of routes (A, B, C or D).
5. Push [START/STOP].
6. If you want to switch ON the time path after the manual route, push soft button [Yes],
Else push soft button [No].

To pause or stop a manual route:

1. Push [START/STOP] or the pause button on the JUNO 150.
2. If you want to:
 - Stop the route immediately, push soft button [Yes].
 - Resume the route, push soft button [No] or the pause button on the JUNO 150.
 - Pause,
 1. Push soft button [Pause].
 2. Push button [△] to select the number of minutes you want to pause.
3. Push soft button [OK].

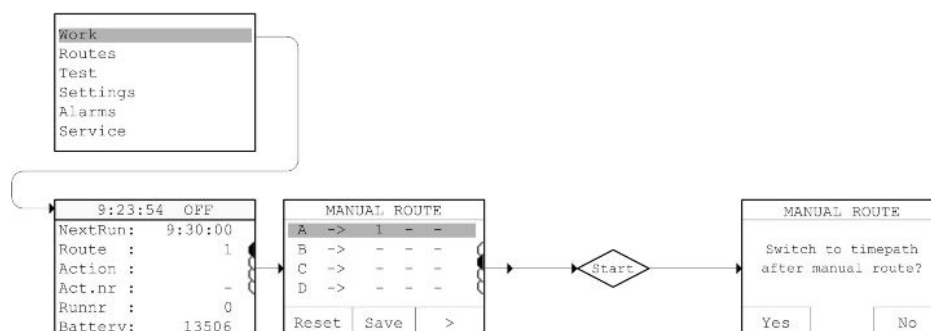


Figure 23. Start a manual route

5.14 Block a Route

1. Stop all timed actions (page 5-14).
2. In the main menu of the Lely Control app, select 'Routes' and push [].
3. Select 'Blockage route' and push [].
4. Push [] to select the route that you want to block and push [].
5. Push [] to block the route (value 1) and push [ESC] to confirm and go one level up.



Blocking a route has no effect on Manual Route (page 5-15).

5.15 Reset the Emergency Stop Button

1. Turn the button counter clockwise and pull it out until it unlocks (see figure on page 2-11).

6. MAINTENANCE

6.1 Introduction

This chapter contains the preventive maintenance schedule and the applicable preventive maintenance procedures for the JUNO 150. It also contains some basic corrective maintenance procedures.

6.2 Preventive Maintenance Schedule

The following table shows the preventive maintenance schedule for the JUNO 150. Preventive maintenance must obey local regulations, if applicable.



The frequencies of the tasks shown in the table are the minimum frequencies recommended.

Maintenance Tasks	Frequencies		
	Operating Months	Operating Years	Note
Clean the charging strips (page 6-5)	1		
Clean the charging electrodes on the charge unit (page 6-5)	1		
Check the battery is charging (page 7-4)	1		
Adjust the skirt height (page 6-6)	4		If the feed alley is not clean enough

6.3 Preparation

6.3.1 Break or close the Power Circuit

To break the power circuit

1. Loosen the knob on the battery stop (see figure on page 6-2) (1).

To close the power circuit

2. Fasten the knob on the battery stop.

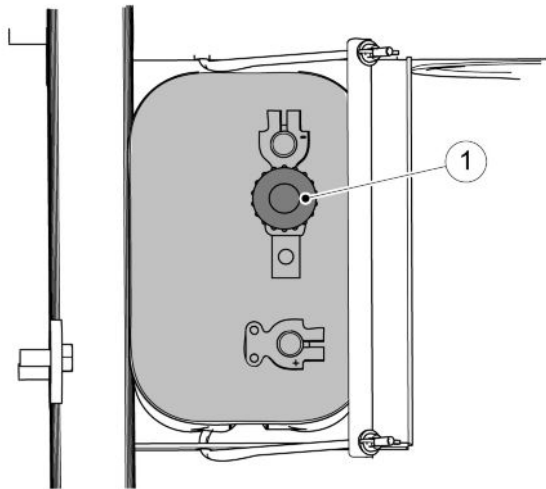


Figure 24. Break the Power Circuit

6.3.2 Remove or Install the Cover

Removal

1. Open the lid(1).
2. Loosen the two elastic fasteners (2) on the inside of the cover that attaches it to the frame.
3. Remove the cover (3).

Installation

4. Install the cover (3).
5. Install the two elastic fasteners (2).

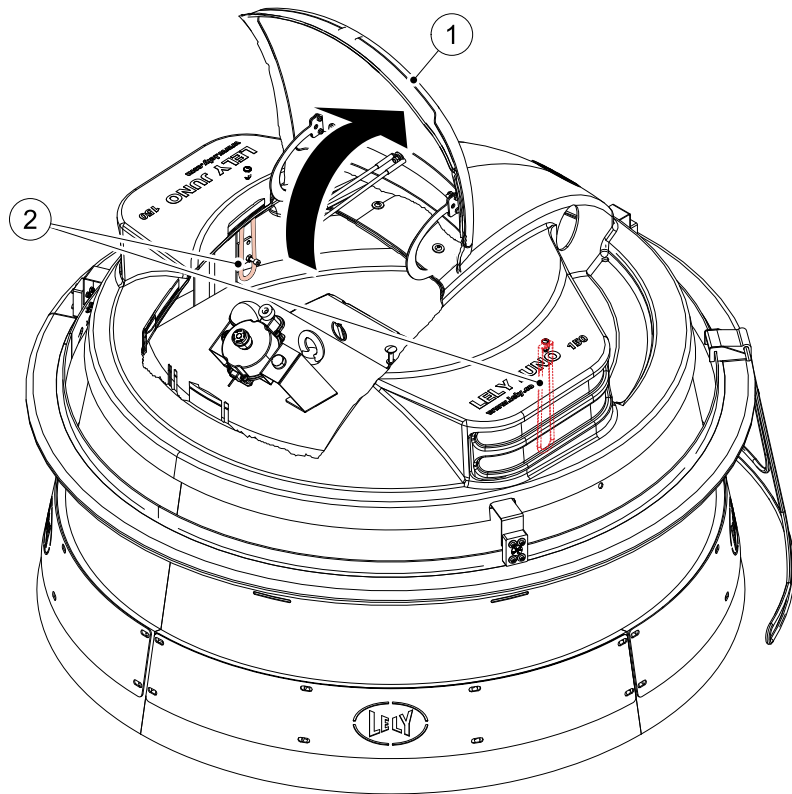


Figure 25. Open the lid. Remove the fasteners

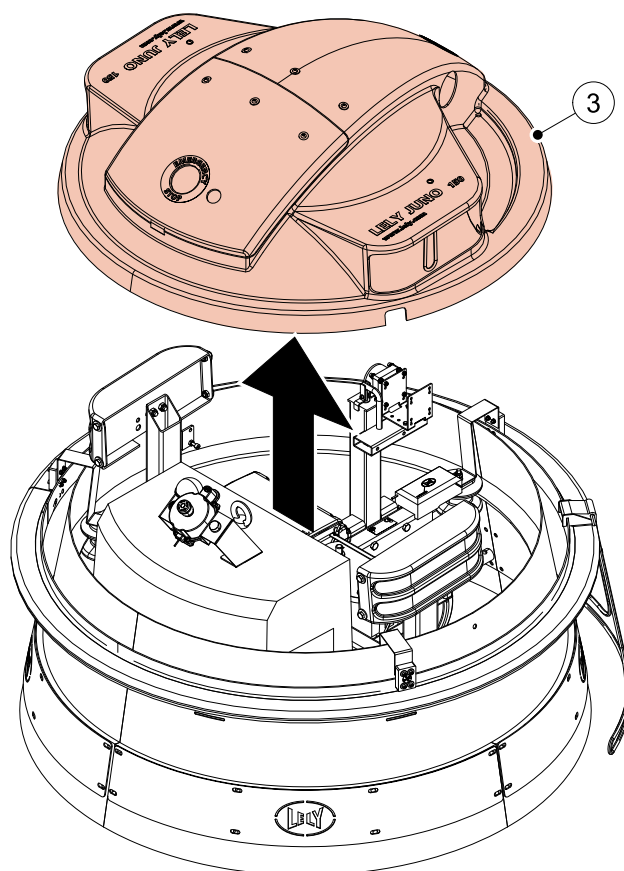


Figure 26. Remove the cover of the motor room

6.3.3 Switch OFF or ON the JUNO 150



The JUNO 150 does not need to be switched OFF during normal operation.

To switch OFF

1. Open the lid.
2. On the PCB-box, push the button [OFF] to take the JUNO 150 out of operation (page 4-4).
3. Close the lid.

To switch ON

4. Open the lid.
5. On the PCB-box push the button [ON] to switch ON the JUNO 150 (page 4-4).
6. Close the lid.

6.4 Maintenance Procedures



***Danger of being entangled by rotating parts.
Keep hands, loose clothing, and long hair away from moving parts
during operation of the JUNO 150.***

6.4.1 Clean the Charging Strips and the Charging Electrodes



***Make sure that after cleaning the charging electrodes slide over the
middle of the charging strips when the JUNO 150 parks.***

Preparation

1. Disconnect the main power supply to the charging station.
2. Manually drive the JUNO 150 to a clean and quiet location (page 5-4).

Clean

3. Thoroughly clean the charging strips (see figure on page 6-6) (1) of the JUNO 150 with sand paper.
4. Thoroughly clean both electrodes of the charging station (2) with a brush or sand paper.

Close-up

5. Connect the charging station to the main power supply.
6. Manually drive the JUNO 150 to the charging station.
7. Examine the charging electrodes slide over the middle of the charging strips when you park the JUNO 150.
8. Start the timed actions (page 5-14).

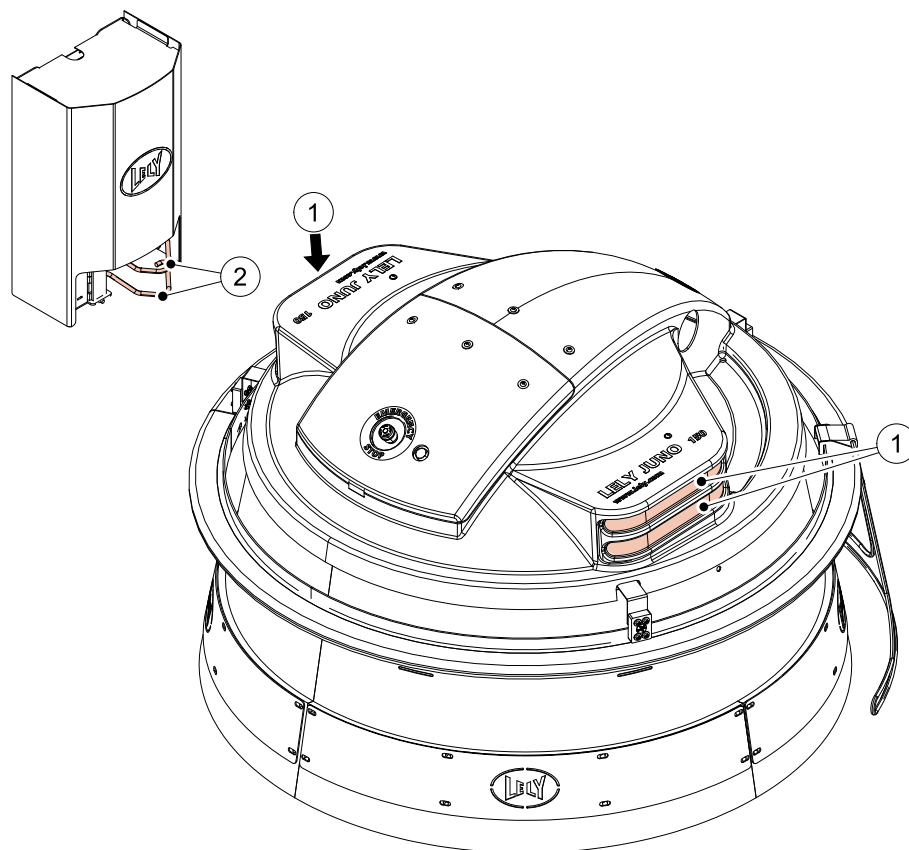


Figure 27. Clean the charging strips and electrodes

6.4.2 Adjust the Skirt Height

Preparation

1. Manually drive the JUNO 150 to a clean and quiet location (page 5-4).
2. Remove the cover.
3. Switch OFF the JUNO 150 (page 6-4).
4. Break the power circuit.

Adjust

5. Loosen the knob (see figure on page 6-7) (3)
6. Turn the handle (1) until the skirt on the side of the feed fence (2) and on the front side (4) reaches the floor.
7. Fasten the knob.
8. Make sure the height of the lower charging strip is 76.5 cm (30.1 in.).

Close-up

9. Close the power circuit.
10. Put the JUNO 150 in operation (page 6-4).
11. Install the cover.

12. Open the Lely Control app on the smartphone.
13. Manually drive the JUNO 150 to the charging station (page 5-5).
14. Make sure the charging strips of the JUNO 150 make good contact with the electrodes.
15. Start the timed actions (page 5-14).

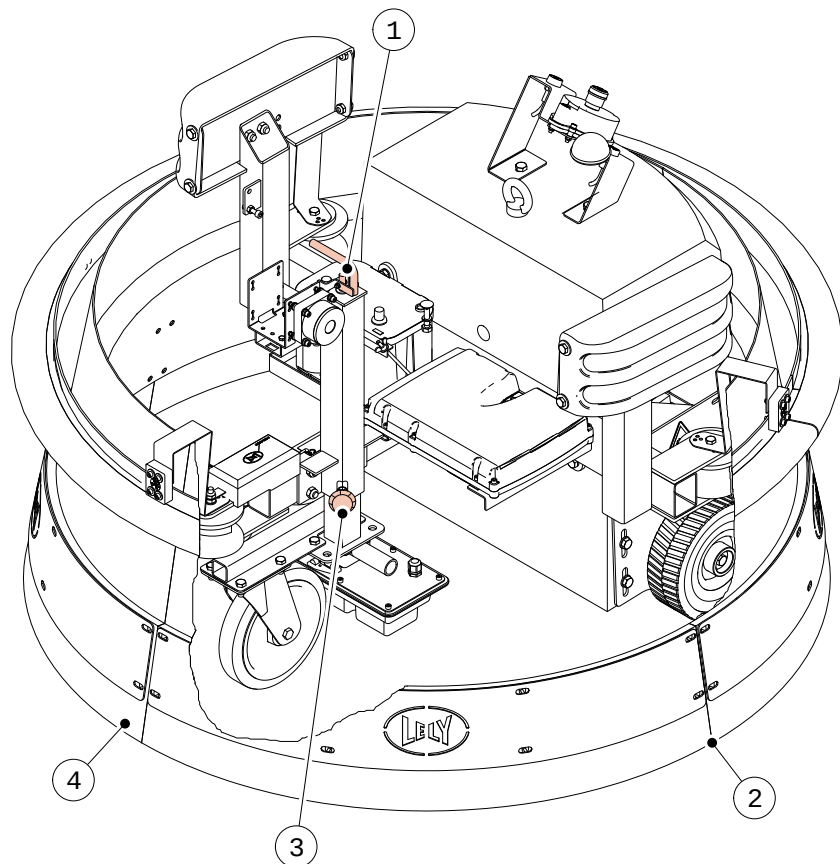


Figure 28. Set the skirt height (without cover)

KEY:

1. Handle - 2. Feed fence side of the skirt - 3. Knob - 4. Front side of the skirt



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7. TEST AND ADJUSTMENT

7.1 Introduction

This chapter contains the test- and adjustment procedures for the JUNO 150 Feed Pusher.



Several options shown on the display of the user interface are not relevant for standard test and adjustment procedures, but may be useful for troubleshooting by the service provider.

7.2 Settings

7.2.1 Set the Real-Time Clock

1. Open (page 5-3) the Lely Control app on the smartphone
2. In the main menu select 'Settings' and push [↵].
3. In the menu 'Settings', select 'RealTime clock' and push [↵].
4. Push soft button [↓] to select a menu item.



The real-time clock has a 24 hour format. For instance 7:00 is not the same as 19:00.

5. Push [△] or [▽] to increase or decrease the value of the selected option.
6. Push [ESC] to confirm and go one level up.

7.2.2 Set the Display Language

1. Open (page 5-3) the Lely Control app on the smartphone
2. In the main menu of the Lely Control app, select 'Settings' and push [↵].
3. Select 'Language' and push [↵].
4. Push [△] or [▽] to select the display language.
5. Push [ESC] to confirm and go one level up.

7.2.3 Modify the Beep Frequency for a Route

1. Open (page 5-3) the Lely Control app on the smartphone
2. In the main menu of the Lely Control app, select 'Routes' and push [].
3. Select 'Beepfreq route' and push [].
4. Select the route you want to modify and push [].
5. Push [] or [] to modify the number of beeps per second.



The standard value 0.5 equals one beep per two seconds.

6. Push [ESC] to confirm and go one level up.

7.2.4 Modify the Beep Length

1. Open (page 5-3) the Lely Control app on the smartphone
2. In the main menu of the Lely Control app, select 'Settings' and push [].
3. Select 'Beep length'.
4. Push [] or [] to modify the length.



The standard value is 200 mSec.

5. Push [ESC] to confirm and go one level up.

7.2.5 Modify the Feed Push Power

1. Open (page 5-3) the Lely Control app on the smartphone
2. In the main menu of the Lely Control app, select 'Settings' and push [].
3. Select 'Feed push power'.
4. Push [] or [] to modify the power.
5. Push [ESC] to confirm and go one level up.

7.3 Tests

7.3.1 Analyse the Reliability of a Route

1. Open (page 5-3) the Lely Control app on the smartphone
2. Stop all timed actions (page 5-14).
3. In the main menu of the Lely Control app, select 'Routes' and push [↩].
4. Select 'Route analysis' and push [↩].
5. Select 'Fail. problyt' and push [↩].



Push [↩] or [ESC] to display routes that are not displayed.

6. If a route has a failure probability of more than 2,
 1. Find out the cause of the unreliability.
 2. Modify the route.
7. Repeat steps 5 to 7.
8. If the route is still not reliable:
 1. Delete the route.
 2. Make a new route.

7.3.2 Test a Route

1. Put the route into a manual route.
2. Start the manual route (page 5-15).
3. Find the actions and action numbers on the display of the user interface of the Lely Control app.
4. Make sure the route is correct.

7.3.3 Make sure the Battery is Loaded

1. Stop all timed actions (page 5-14).
2. In the main menu of the Lely Control app, select 'Work' and push [↩].
3. Make sure the battery voltage is more than 12500 mV (fig. 1).
4. If the voltage is less than 12500 mV:
 1. Manually drive the JUNO 150 to the charging station.
 2. Make sure the battery is charging (page 7-4).
5. Charge the battery for one hour.

9:23:54	OFF
NextRun:	9:30:00
Route :	1
Action :	
Act.nr :	-
Runnr :	0
Battery:	13506

Figure 29. Battery voltage

7.3.4 Make sure the Battery is Charging

1. Make sure the JUNO 150 is connected to the charging station.
2. Stop all timed actions (page 5-14).
3. In the main menu of the Lely Control app, select 'Work' and push [↩]. (three times).
4. Make sure the menu MANUAL CHARGER is displayed.
5. Make sure the charging current is more than 1.0 A.
6. If the charging current is less than 1.0 A, make sure the orange LED on the charging station is ON.
7. If not, make sure the main power is connected to the battery charger.
8. If the JUNO 150 is still not charging, make sure the electrodes are connected to the battery charger.
9. If the JUNO 150 is still not charging, clean the charging strips and the electrodes (page 6-5).
10. If the JUNO 150 is still not charging, make sure all power connections are connected properly.
11. If the JUNO 150 is still not charging, call the local service provider.

MANUAL CHARGER	
	
13.5V	
8.0A	
L	R

Figure 30. Battery charging current

7.3.5 Make sure the Bluetooth Connection is Reliable

1. Start the Lely Control app on the smartphone.
2. Connect the smartphone to the JUNO 150.
3. Push the button 'Settings' at the bottom of the smartphone display.
4. Select 'Signal Strength'.
5. Examine the value of the signal of the JUNO 150.
 - 0 = very good
 - -20 - -25 = poor
 - < -25 = very bad

7.3.6 Test the Ultrasonic Sensor

Test

1. Manually drive the JUNO 150 to a location more than 6 m (6.6 yrd) from a wall.
2. Make sure no object is between the ultrasonic sensor and the wall.
3. In the main menu of the Lely Control app select 'Test' and push [↩].
4. Select 'Ultrasound' and push [↩].
5. If the ultrasonic sensor is on the left, push soft button [L], else push [R].
6. Make sure the JUNO 150 is between you and the wall.



Make sure not to interrupt the sensing beam.

7. Monitor the display of the user interface.
8. Make sure the 'Puls 1', 'Puls 2', 'Puls 3' and 'Filter' values are 0.
9. If the values are not 0, clean the ultrasonic sensor with a tissue.
10. Repeat the steps 7 and 8.
11. If the values are not 0, call your local Lely service provider.
12. If the puls and filter values are 0,
 1. Put an object exactly 1 m. (1.1 yrd) from the ultrasonic sensor.
 2. Make sure the Puls 1 and Filter show 1000 (mm).

Else call your local service provider.

Close-up

13. Manually drive the JUNO 150 to the charging station.
14. Start the timed actions (page 5-14).

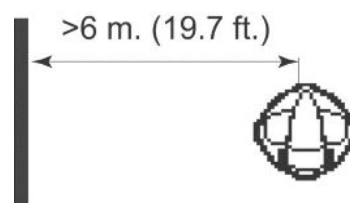


Figure 31. Test the ultrasonic sensor



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8. TROUBLESHOOTING

8.1 Introduction

This chapter contains the troubleshooting procedures for the JUNO 150.

- Alarms and reports
- Troubleshooting table
- Recovery procedures.

8.2 Alarms and Reports

The JUNO 150 Feed Pusher monitors itself continuously. As soon as it detects an error it generates a message, the system also generates and displays reports with important information:

- A critical alarm message: 3 beeps sound and the JUNO 150 stops functioning. The user interface on the smartphone displays the message "ALARM" with a description (page 8-1). The error requires an error recovery procedure.
- A non-critical report is recorded in the report list, the JUNO 150 continues functioning.

The system also displays information about the operation of the JUNO 150.

8.2.1 Recover alarms

Confirm an alarm

When the JUNO 150 is in normal operation and a critical alarm occurs:

- An alarm message is displayed on the smartphone.
- The LED in the pause button on the JUNO 150 blinks.
- An alarm sounds.

To recover the critical alarm:

1. Press any key on the smartphone to accept the alarm. The alarm sound stops. The LED in the pause button turns on.

When the alarm:

- Is caused by the emergency stop button or
- The collision detector while the motors ran too long after the alarm was caused

The LED in the pause button still blinks. On the smartphone the message 'Push the pause button to release the safety circuit' is displayed.

2. Push the pause button on the JUNO 150. The JUNO 150 goes into pause mode. The LED in the pause button is continuously on. 'Continue with current route?' is displayed on the smartphone.

Continue normal operation

When the alarm is confirmed, on the smartphone press:

- **[Yes]** to continue the current route.

Or:

- **[No]** to go to the main menu.
 1. Select 'Alarms' > 'Alarm List'. The display displays the number, the date and time when the alarm occurred and the alarm number, see the example below.
 2. Note the alarm number and refer to the alarm list (page 8-1).
 3. Do the recovery procedure described in the alarm list.

No.	Date	Time	Alarm
1	4-1	22:17	7
2	4-1	21:33	10



Select an alarm in the list and push [>] to open the alarm message for extra information.

Or:

- **[MAN]** to put the JUNO 150 in a proper position to continue with the current route. The message 'SAFETY WARNING. Manual operation is permitted only with a clear overview of the vehicle. Confirm?' appears on the smartphone display.
 1. Confirm if you have a clear overview of the JUNO 150.
 2. Press 'Esc' > **[Yes]** to continue with the current route.

8.2.2 Alarm List

The table below gives the alarm numbers and any actions to be taken:

Alarm code	Alarm message	Description / cause	Recovery procedure
1	EMPTY_BATTERY "Battery power too low to start route, charge first!"	- Bad contact with battery charger due to dirt and/or corrosion. - Loose connections.	- Clean the charging strips and the charging electrodes (page 6-5). - Manually drive the JUNO 150 to the charging station (page 5-5). - Make sure the battery is charging (page 7-4). - If the problem remains, call your local Lely service provider.
3	JUN_OFF_RANGE Juno lost -> searching reset point (strip) Test the inductive sensors	- JUNO 150 should have passed reset strip. - Incorrect height inductive sensor.	Call your local Lely service provider.
4	TURN BLOCK Juno can not make the turn!	- Mechanical problem, worn parts, dirt causing resistance - Turn action too difficult	- Make sure there are no obstacles. - Make sure the rotating skirt is free to rotate. If not, call your local Lely service provider. - Make sure the rubber skirt is not worn. If the rubber skirt is worn out, call your local Lely service provider. - Analyse the route and make a more reliable route if necessary (page 7-3). - If the problem remains, call your local Lely service provider.
5	NO TIME No active time!	Time path is empty	Set the time path and try again (page 5-13).
6	BLOCKAGE_JUN Juno blocked!!	- Obstacle - Gyroscope inaccurate	- Make sure there are no obstacles. - Try to run the route again. - If the JUNO 150 is blocked by the forage, make routes with smaller intervals. - If the JUNO 150 is blocked at a different place, calibrate the gyroscope (page 8-19).

7	JUNO_LOST Juno deviates from correct directn! - obstacle - gyro drifting - bend in route		1. Make sure there are no obstacles. 2. Calibrate the gyroscope (page 8-19). 3. Test the ultrasonic sensor. 4. Start the timed actions (page 5-14). 5. If the problem remains: 1. Analyse the route and make a more reliable route if necessary (page 7-3). 1. If the problem remains, call your local Lely service provider.
8	TURN ERROR Juno turns more than 360 deg! - Check gyroscope - Calibrate via menu Settings		1. Calibrate the gyroscope (page 8-19). 2. If the problem remains, call your local Lely service provider.
9	LOADING No charging current! Check charge strips for dirt	• JUNO 150 does not reach the charging station.	1. Clean the charging strips and the charging electrodes (page 6-5). 2. Manually drive the JUNO 150 to the charging station (page 5-5). 3. Make sure the battery is charging (page 7-4). 4. If the problem remains, call your local Lely service provider.
10	STARTUP	• Alarm appears with every startup of the JUNO 150. For information only.	
11	ROUTE-MEMORY Route memory is full. First delete one route!!	• Route memory has reached the maximum of 16 different routes.	1. Delete a route prior to programming a new one.
12	NO_ULTRASIGN No ultrasound signal: - dirt on sensor - no object	• Dirt on the ultrasonic sensor • No object within reach of the sensor. • Sensor broken.	1. Clean the ultrasonic sensor. 2. Test the ultrasonic sensor. (page 7-5) 3. If the problem remains, call your local Lely service provider.

13	BENDSKIDDING Juno skid in the turn!		1. Make sure the floor is not slippery. 2. Make sure the wheels are not worn out. If the wheels are worn out, call your local lely service provider. 3. Make sure the rubber skirt is not worn out. If the rubber skirt is worn out, call your local Lely service provider. 4. Manually run the route again (page 5-15). 5. If the problem remains, call your local Lely service provider.
14	EXTRA CHARGE1	• Voltage is too low, the JUNO 150 charges for an extra hour. For information only.	
15	EXTRA CHARGE2	• The JUNO 150 charges for an extra hour. For information only.	
16	EXTRA READY1	• Recharging is complete. For information only.	
17	EXTRA READY2	• Recharging is complete. For information only.	
18	CHARG TIMEOUT Timeout charger: battery not charging! Check charge LEDs on charger and clean charge strips	• Battery not full despite charging.	1. Clean the charging strips and the charging electrodes (page 6-5). 2. Manually drive the JUNO 150 to the charging station (page 5-5). 3. Make sure the battery is charging (page 7-4). 4. If the problem remains, call your local Lely service provider.
19	DOUBLE TIME Similar points in time exist!		1. Correct the start and end times in the time path (page 5-13).
20	BATTVOLT LOW Battery power too low to start route! Drive JUNO 150 to charger or clean charge strips!		1. Clean the charging strips and the charging electrodes (page 6-5). 2. Manually drive the JUNO 150 to the charging station (page 5-5). 3. Make sure the battery is charging (page 7-4). Put the JUNO 150 in operation. If the battery is charged sufficiently, the JUNO 150 will continue automatic operation. 4. If the problem remains, call your local Lely service provider.

21	SKIDDING. WFL	The JUNO 150 skids too much.	- Make sure the floor is not slippery. - Make sure the wheels are not worn out. If the wheels are worn out, call your local lely service provider. - Test the route (page 7-3).
22	SKIDDING_STOP Juno skids!	The JUNO 150 stopped because alarm 13 was generated five times.	- Make sure the rubber skirt is not worn or damaged. If the rubber skirt is worn out, call your local lely service provider. - Manually run the route again (page 5-15). - If the problem remains, call your local Lely service provider.
23	HEAVY DRIVE Juno drives hard!!	The JUNO 150 has difficulties driving the route.	If the alarm is repeated more than 5 times per week: - Make sure there are no obstacles. - Make sure the driving distance from the feed fence is different each route. - If the problem remains: - Analyse the route and make a more reliable route if necessary (page 7-3).
24	FLASH-ERROR Flash error!!	Flash memory communication error.	Call your local Lely service provider.
25	SHORT-CIR. 1L Short-circuit motor 1 Left wheel	Short circuit in the left motor, the cables or the pcb.	Call your local Lely service provider.
26	SHORT-CIR. 2R Short-circuit motor 2 Right wheel	Short circuit in the right motor, the cables or the pcb.	Call your local Lely service provider.
27	BACKUP ERROR Error backup: Try again!	- Smartphone not properly connected - Software on the smartphone is not correct - Smartphone is broken - Not enough storage space available	- Make sure the smartphone is connected properly via bluetooth. - Make sure to use the correct version (page -1) of the Lely Control app. - Free up storage space. - Try to make another backup (page 5-13). - If the problem remains, call your local Lely service provider.

29	NO_GYRO_START Factory startup gyro failed! Cooldown gyro and startup gyro again	Factory calibration failed.	1. Call your local Lely service provider.
30	M1 THERMISCH Motor 1 thermic out	Current left motor too high, probably due to dirt or worn parts.	- Remove any dirt or obstacles. - Call your local Lely service provider.
31	M2 THERMISCH Motor 2 thermic out	Current right motor too high, probably due to dirt or worn parts.	- Remove any dirt or obstacles - Call your local Lely service provider.
32	COOL DOWN Gyro is too hot to do a factory startup. Let gyro cool down first	The JUNO 150 pauses to cool down the motors.	For information only.
33	FULL CHARGING	The JUNO 150 must charge fully during nighttime.	1. Modify the time path: provide more charging time (max. 40% drive time).
34	BATT FULL	Battery is full. For information only.	
35	BATT ERROR	- Battery recharge failed, charging current too low. - Bad contact with battery charger due to dirt or corrosion. - Loose connections	- Make sure the mains voltage is correct for the battery charger. - Clean the charging strips and the charging electrodes (page 6-5). - Make sure the battery is charging (page 7-4). - Charge the JUNO 150.
36	NO_GYRO_START Gyroscope does not startup correct!		1. Call your local Lely service provider.
37	GYRO ANGLEFACT Angle calibration gyro not correct	Gyroscope angle not calibrated.	1. Call your local Lely service provider.

38	LOADING No charging current! Check charge strips for dirt	• Bad contact with battery charger due to dirt or corrosion. • Loose connections.	1. Clean the charging strips and the charging electrodes (page 6-5). 2. Make sure the battery is charging (page 7-4).
39	GYRO_TEMP Gyroscope not on temperature! Check power supply	• Gyroscope startup calibration is not done.	1. Calibrate the gyroscope (page 8-19).
40	CAL_IND_ZERO Inductive sensor values not correct --> much deviation!! Are the sensors above guide strip?		1. Call your local Lely service provider.
41	GYROANGLEFACT Angle calibration gyro not correct. Calibration values gyro not correct! -not exactly 5 turns - gyro drifts - calibrate gyro	• Gyroscope angle not calibrated.	1. Call your local Lely service provider.
42	CALIBR_I_PCB Calibrate voltage PCB not good -> deviation too high!	• Error during calibration	1. Call your local Lely service provider.
43	BATTERY_STOP Juno battery runs down. Switch off or charge Juno	• More than 24 hours not charged. • The JUNO 150 started a route when not on charger. • The JUNO 150 stops and beeps for 1 hour. • Time path is started.	1. Clean the charging strips and the charging electrodes (page 6-5). 2. Manually drive the JUNO 150 to the charging station (page 5-5). 3. Make sure the battery is charging (page 7-4). 4. Charge the JUNO 150 (page 8-19). 5. Start the time path (page 5-14).

44	BATT_FATAL_ER FATAL ERROR! Battery becomes overloaded. Remove Juno from loader Call Lely!		1. Call your local Lely service provider.
45	GYRO_TYPE		1. Call you local Lely service provider.
46	GYRO_AUTOCA L Auto calibration of the gyro is finished	This alarm appears with every successful autocalibration of the gyroscope. For information only.	
47	GYRO_AUTOST OP Auto calibration of gyroscope is interrupted! Calibrate gyroscope (menu Settings)		1. Calibrate the gyroscope (page 8-19). 2. If the problem remains, call your local Lely service provider.
48	BATTERY_OFF	After 1 hour of alarm #43, the JUNO 150 will power off to protect the battery.	1. Clean the charging strips and the charging electrodes (page 6-5). 2. Manually drive the JUNO 150 to the charging station (page 5-5). 3. Make sure the battery is charging (page 7-4).
49	BATTERY_CAB LE Loader error! Check cable connections	Charging current not available when starting test route.	1. .Call your local Lely service provider.
50	DIRECTION_JU N Juno not in correct direction! - obstacle - gyro drifting - bend in action		1. Make sure there are no obstacles. 2. Calibrate the gyroscope (page 8-19). 3. Test the ultrasonic sensor (page 7-5). 4. Start the timed actions. 5. If the problem remains: 1. Analyse the route and make a more reliable route if necessary (page 7-3). 1. If the problem remains, call your local Lely service provider.

51	NOT_IND_ZERO Inductive sensors not calibrated!!		1. Call your local Lely service provider.
52	ULTRAS_CALIB	• Start pulse ultrasonic sensor not calibrated.	1. Call you local Lely service provider.
53	CALIBR_I_PCB		1. Call you local Lely service provider.
54	CLOCK ERROR The 24 hours clock is not correct -> adjust the time!!	• Internal clock is not set.	1. Make sure the real-time clock is set in the correct 24 hour format (page 7-1). 2. Make sure all start and end times in the time path are entered in the correct 24 hour format (page 7-1). 3. Set the real-time clock (page 7-1). 4. Adjust the start and end times if necessary (page 5-13).
55	BACKUP ERROR2	• No backup on the smartphone	1. Make a Backup (page 5-13).
56	SHORT-CIR. 34 Shortcut on motor #3 & #4 connectors		1. Call you local Lely service provider.
57	GYRO_SPI		1. Call you local Lely service provider.
58	GYRO_I_INSTAB		1. Call you local Lely service provider.
59	GYRO_TIMEOUT		1. Call you local Lely service provider.
60	GYRO BIAS1 Gyrovalue drifts - Try again after 10 sec - Calibrate via menu Settings		1. Call you local Lely service provider.
61-64	GYRO BIAS2 - 5 Gyro value drifts Juno automatically starts route!		1. Call you local Lely service provider.
65	GYRO_TYPE		1. Call you local Lely service provider.
66	GYRO_I_NOT 0		1. Call you local Lely service provider.

71	BLOCKAGE_JU NO Juno blocked!!	- Obstacle. - Gyroscope inaccurate.	- Make sure there are no obstacles. - Try to run the route again. - If the JUNO 150 is blocked by the forage, make routes with smaller intervals. - If the JUNO 150 is blocked at a different place, calibrate the gyroscope (page 8-19).
73	NO_ULTRASIG N	- No signal from the ultrasonic sensor. - Dirt on sensor. - No object. - No signal during 1,5 seconds.	- Clean the ultrasonic sensor. - Test the ultrasonic sensor (page 7-5).
77	EXTRA CHARG3	Battery JUNO 150 has insufficient capacity to complete the route	The route starts automatically when the battery is charged.
78	EXTRA READY3	Battery JUNO 150 has insufficient capacity to complete the route	The route starts automatically when the battery is charged.
79	JUNO_SLIP	The JUNO 150 slips during a route action.	- Make sure the floor is not slippery. - Make sure the wheels are not worn out. If the wheels are worn out, call your local lely service provider. - Test the route (page 7-3). - If the problem remains, decrease the motor power (page 4-22).
80	EMERG_BUTTO N Emergency stop button pushed!! Reset the emergency stop button		- Reset the emergency stop button (page 5-16). - Start the timed actions (page 5-14).
81	COLL_DET_ST OP Collision detector activated!	- Wire damage - Internal damage collision sensor.	Make sure there are no obstacles.
82	EMERG_BUTTO N Emergency stop button pushed!! Reset the emergency stop button		- Reset the emergency stop button (page 5-16). - Start the timed actions (page 5-14).

83	COLL_DET_ST OP Collision detector activated!		1. Make sure there are no obstacles.
84	EMERG_HARD WRE Hardware safety protection! Circuit interrupted!! Call Lely!		1. Call you local Lely service provider.
85	LID OPEN PROT Lid open protection! Lid must be closed when the Juno drives!	Lid open protection! Lid must be closed when the Juno drives!	1. Push []. 2. Push soft button Yes to continue. 3. Close the lid.
86	LID OPEN PROT Lid open protection! Lid must be closed when the Juno drives!	Lid open protection! Lid must be closed when the Juno drives!	1. Push []. 2. Push soft button [Yes] to continue. 3. Close the lid.
87	EMERG_CIRC1		1. Call you local Lely service provider.
88	EMERG_CIRC2		1. Call you local Lely service provider.
89	FPGA_ERROR FGPA does not start!! Reset PCB		1. Call you local Lely service provider.
90-98	Software 1-9 Software FAILURE Call Lely!		1. Call your local Lely service provider.
99	COLL_DET_ST OP Collision detector activated!	• The JUNO 150 collided	1. Make sure there are no obstacles.
100	COLL_DET_ST OP Collision detector activated!		1. Make sure there are no obstacles. 2. If the problem remains, call your local Lely service provider.

101	NO STRIP JUNO 150 lost the guide strip!!		1. Make sure the JUNO 150 is above the strip. 2. If the problem remains, call your local Lely service provider.
102	STRIP LOST JUNO 150 lost the guide strip!!		1. Make sure the JUNO 150 is above the strip. 2. If the problem remains, call your local Lely service provider.
125	UNDER_V_BAT	• Battery voltage is too low.	1. Charge the battery. 2. If the problem remains, call your local Lely service provider.

8.2.3 Read a Report

1. Open (page 5-3) the Lely Control app on the smartphone
2. Stop all timed actions (page 5-14).
3. In the main menu of the Lely Control app, select 'Alarms' and push [↩].
4. Select 'Report list' and push [↩] .

The display displays the number, the date and time the report was recorded and the report number, like in the following example:

No.	Date	Time	Rep
1	4-1	20:10	6
2	4-1	21:31	15



Select a report in the list and push [↩] to open the report message for extra information.

5. Note the report number and look it up in the report list.
6. Do the indicated procedure.

8.2.4 Report List

The table below gives the report numbers and any actions to be taken:

Report code	Report	Description/Procedure
1	Timepath contains x % drive time	The JUNO 150 must not drive more than 40% of the total time in a time path. It must spend minimum 60% of the total time charging at the charge station.
2	Left chain is slack. Check chain tension	1. Call your local Lely service provider.

3	Right chain is slack. Check chain tension	1. Call your local Lely service provider.
4	Left tire has a smaller diameter. Route less reliable!!	1. Call your local Lely service provider.
5	Right tire has a smaller diameter. Route less reliable!!	1. Call your local Lely service provider.
6	Drive distance increases Check skid. Route less reliable!!	1. Make sure the floor is not slippery. 2. Make sure the JUNO 150 does not skid.
7	Ultrasound sensor gives too many reflex Check startpulse Clean ultrasound sensor Install cover correct	1. Clean the ultrasound sensor. 2. Make sure the cover does not cover the sensor. 3. If the problem remains, call your local Lely service provider.
8	Ultrasound sensor gives too many reflex Check startpulse Clean ultrasound sensor Install cover correct	1. Clean the ultrasound sensor 2. Make sure the cover does not cover the sensor. 3. If the problem remains, call your local Lely service provider.
9	Left motor drives harder than the right motor ->check the drive and the motor	1. Call your local Lely service provider.
10	Right motor drives harder than the right motor ->check the drive and the motor	1. Call your local Lely service provider.
11	Low charging current! -Clean chargingstrips -Check charger	1. Manually drive the JUNO 150 to the charging station. 2. Clean the charging strips and the charging electrodes (page 6-5). 3. Make sure the battery is charging (page 7-4).
12	The charging current is too low, check connection points and power	Refer to report 11.
13	Battery condition bad Install a new battery	1. Install a new battery (operator is NOT allowed to open the PCB box).
14	Battery is overloaded too many times See battery yield and check battery and capacity	Vehicle drives back 2 m automatically to protect the battery. 1. Call your local Lely service provider.
15	"Battery power too low to start route, charge first! "	1. Clean the charging strips and the charging electrodes (page 6-5). 2. Charge the JUNO 150 (page 8-19).
16	Battery power too low to start route! Drive JUNO 150 to charger or clean charge strips!	1. Clean the charging strips and the charging electrodes (page 6-5). 2. Charge the JUNO 150 (page 8-19).
17	JUNO 150 is not finished with test route. Please switch on the route.	1. Call your local Lely service provider.

18	Battery condition deteriorates. Check battery	1. Call your local Lely service provider.
19	The current of the batt is low when the JUNO 150 drives	1. Call your local Lely service provider.
20	Bad signal of: - ultrasound sensor	1. Clean the ultrasonic sensor.
21	Route is not correct - unreliable - see route analysis - see manual	1. Analyse the route and make a more reliable route if necessary (page 7-3).
34	Battery is charged The charge cyclus is complete	For information only.
50 - 55	Battery is overloaded too many times See battery yield and check battery and capacity	1. Call your local Lely service provider.
60	Ultrasound sensor gives too many reflex Check startpulse Clean ultrason sensor Install cover correct	1. Clean the ultrasonic sensor. 2. Test the ultrasonic sensor. 3. If the problem remains, call your local Lely service provider.
61	Bad signal of: - ultrasound sensor	1. Clean the ultrasonic sensor.
62	Gyroscope values deviate ->check drift!	1. Calibrate the gyroscope (page 8-19). 2. If the problem remains: 1. Analyse the route and make a more reliable route if necessary (page 7-3).

8.2.5 Information Report List

The table below gives the reports that are not recorded and any actions to be taken:

Description	Explanation
Too many actions in one route. Not possible to finish the route!!	The number of actions in the present route is more than the maximum 125. You must start again, break up the route in smaller parts.
You have the possibility to program x actions in this route!!	Gives you the number of actions left in the present route until the maximum 125 is reached.
ERROR: timepath contains % of the drive time. Max 40%	The JUNO 150 must not drive more than 40% of the total time in a time path. It must spend minimum 60% of the total time charging at the charging station. Delete some routes from the time path
NOTE: Gyroscope! End actions straight Alternate long action with short action	For information only.
Is JUNO 150 nose in the correct direction?	Manually turn the vehicle in the correct direction with Manual Drive (page 5-4) if the direction is not correct.

At start ultrasound action, JUNO 150 was not pointing in the intended direction Route less reliable!!	Angle of more than 20 degrees between the start and the reset point. This could be due to an angled start point. Refer to Failure Analysis.
ERROR: Distance correction on exist routes -> check on skid during drive	The control system has corrected the drive distance because the expected bump point was not reached in time. This could be due to skidding. Refer to Control System.
Direction ERROR - Action with bends - Gyroscope drifting Route is not reliable!	The driving direction is not reliable. This could be due to a drifting gyroscope or to a programmed action that did not follow a straight course (too much feed at the feed alley when route was programmed).
9 standard turns Switch between the 3 screens with Enter and Escape!	You can choose from 9 standard turns that are displayed on 3 screens. Push [] to open the next screen, or [ESC] to go one level up.

8.3 Troubleshooting Tables

8.3.1 Troubleshooting Table JUNO 150 Vehicle

Symptom	Possible cause	Action
The smartphone does not connect to the JUNO 150 / connection lost	The farmer password is not set on the smartphone	1. Ask the Lely service provider for the password, see install or update the app (page 5-1)
	The smartphone is not paired with the JUNO 150.	1. Make sure bluetooth of the smartphone is switched on. 2. Examine in the bluetooth settings of the smartphone if the JUNO 150 is paired. If not, try to pair (PIN = '0000'). Refer to the user manual of the smartphone.
	The JUNO 150 is switched OFF	1. Switch ON the JUNO 150 (page 5-2)
	The distance between the smartphone and the JUNO 150 is too big	1. Move the smartphone towards the JUNO 150 and try to connect (page 5-3).
The vehicle does not move	JUNO 150 is switched OFF	1. Switch ON the JUNO 150 2. Start the timed actions
	The route is blocked	1. Remove the blockage
	The battery is low	1. Drive the JUNO 150 to the charging station 2. Charge for one hour
	The fuse is blown	1. Call your local Lely service provider

Symptom	Possible cause	Action
	The power supply is not connected	1. Connect the power supply (page 4-4)
	The emergency stop button is pushed	1. Reset the emergency stop button 2. Start the timed actions
The vehicle does not start a route	The emergency stop button is pushed	1. Reset the emergency stop button (page 5-16) 2. Start the timed actions
	The collision detector is activated	1. Make sure the collision detector has no contact with any object.
	The route is blocked	1. Remove the blockage
	No route is programmed	1. Program a route
	Time path is not set	1. Set the time path
		1. If the problem remains, call your local Lely service provider.
The JUNO 150 vibrates more than normal when driving	The chains are not tightened correctly	1. Call your local Lely service provider.
JUNO 150 swings	The gyroscope is drifting	1. Test the gyroscope 2. Calibrate the gyroscope
	The ultrasonic sensor does not function correctly	1. Clean the ultrasonic sensor 2. Test the ultrasonic sensor
	Other	1. Call your local Lely service provider.
JUNO 150 does not stop at the charging station	The charging strips or electrodes do not make contact	1. Clean the charging strips and the charging electrodes.
	No power supply	1. Make sure the charging station is connected to the power supply.
	Springs that hold the electrodes are loose	1. Call your local Lely service provider.
	Other	1. Call your local Lely service provider.
JUNO 150 does not follow the guiding strip		1. Call your local Lely service provider.
JUNO 150 is 'searching' the fence when driving Ultrasound L		1. Call your local Lely service provider.

Symptom	Possible cause	Action
The skirt does not rotate smoothly	The rubber skirt is worn out.	1. Call your local Lely service provider.
JUNO 150 has problems with pushing the feed to the fence	The action Ultrasound L is programmed instead of Feed push L to push the feed	1. Program a new route
	Pushing intervals between the programmed routes are too large	1. Program new routes with smaller intervals (not more than 25 cm or 9.8 in.)
	There was too much feed in front of the feed fence during programming the routes	1. Remove the feed and program a new route.
	The skirt of the JUNO 150 does not rotate smoothly	1. Adjust the skirt height (page 6-6).
	Other	1. Call your local Lely service provider.
While pushing feed, feed is coming under the skirt or the feed alley is not clean	The skirt is too high	1. Adjust the skirt height (page 6-6).
	The skirt is worn	1. Call your local Lely service provider.
	Other	1. Call your local Lely service provider.
The backup process of the routes does not function	The software version of the smartphone is not correct	Make sure the software version on the smartphone is correct. If the version is not correct update the smartphone software.

8.3.2 Troubleshooting Table JUNO 150 Charging Station

Symptom	Possible cause	Action
Green and Yellow LED together blink 2 times, followed by a few seconds rest	Battery loader defect	Call your local Lely service provider.
Green and Yellow LED together blink 4 times, followed by a few seconds rest	Temperature lower than - 15 degrees C (5 degrees F)	Warm the barn and try again.
	Battery loader defect	Call your local Lely service provider.
Green and Yellow LED together blink 5 times, followed by a few seconds rest	Internal temperature is higher than 85 degrees C (185 degrees F)	Remove plug from the mains. Connect plug and retry after one hour.
Green and Yellow LED together blink 7 times, followed by a few seconds rest	Current too high (>20 A).	Remove short-circuit, else: Call your local Lely service provider.

8.4 Recovery Procedures

8.4.1 Reset the System

1. Switch the JUNO 150 OFF and then ON.

8.4.2 Calibrate the Gyroscope

1. Open (page 5-3) the Lely Control app on the smartphone.
2. Stop all timed actions (page 5-14).
3. Select 'Settings' and push [↩].
4. Select 'Gyroscope'.
5. The message 'SAFETY WARNING. Manual operation is permitted only with a clear overview of the vehicle. Confirm?' appears on the smartphone display. Confirm if you have a clear overview of the JUNO 150.



Do not move the JUNO 150.

6. Push soft button [Yes] and wait until you hear a beep sound (approximately 5 minutes).

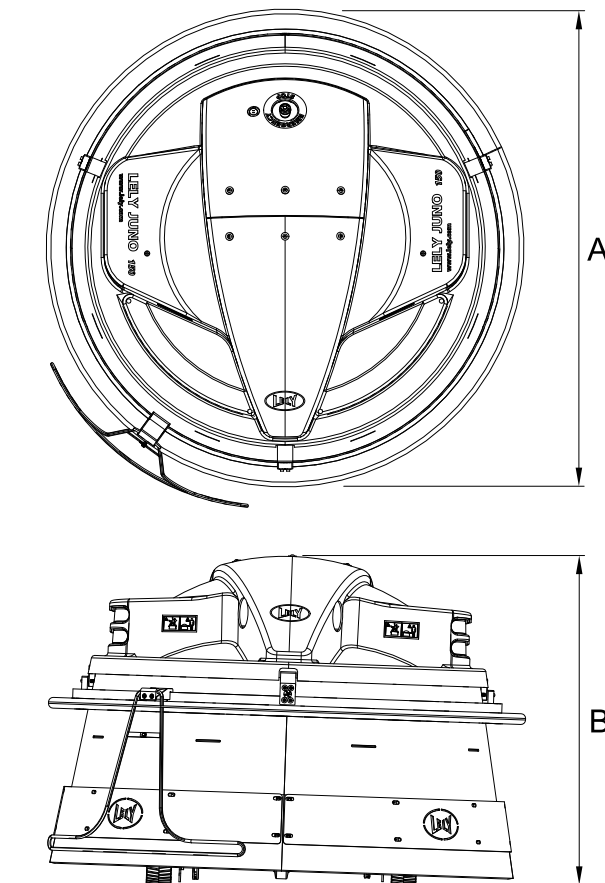
8.4.3 Charge the JUNO 150

1. Manually drive the JUNO 150 to the charging station.
2. Make sure the JUNO 150 is charging (orange and green LEDs are ON).
3. Let the JUNO 150 charge for a minimum of one hour.



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9. DIAGRAMS



A: 156 cm (61 inch)

B: 106 cm (42 inch)



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GLOSSARY OF TERMS

action: building block for a route, for instance 'Strip follow' or 'Feed push L'

alarm: alarm message on the smartphone display that requires an error recovery procedure

Android: operating system for smartphones and tablet computers.

approx: approximately

cm: centimeter

collision detector: a safety feature that ensures the feed pusher to stop immediately if it encounters an obstacle

encoder: electronic device to measure the number of rotations

EU: European Union

gyroscope: electronic device for measuring or maintaining orientation

in: inch

inductive sensor: a device which ensures the unit follows the programmed routes accurately

kg: kilogram

lb: pound

LED: Light Emitting Diode

Lely Control app: Control software on a smartphone, used to adjust the settings or manually control the installation.

m: metre

mA: milliAmperes

manual route: (series of) routes that can be started manually

PCB: printed circuit board with electrical components.

report: message on the smartphone display that informs you about the status of the JUNO 150 or actions to be taken

route: route through a (part of a) barn

route analysis: built-in function to analyse the probability of failures per route and to indicate the actions that causes the risk

skirt: a rotatable surface, at the lower part of the JUNO 150 that pushes the feed towards the feeding fence

time path: 24 hour time schedule with 48 routes maximum

ultrasonic sensor: electronic device for measuring the distance to an object

V: Volt

yd: yard (36 inches)



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INDEX

B

battery.....	3-1
<i>loading</i>	7-3

C

caution.....	2-1
charging station.....	4-8
clock, set the real-time clock.....	7-1

D

danger.....	2-1
-------------	-----

E

electrical power.....	3-1
encoder.....	4-7

F

feed push.....	4-16
follow strip.....	4-13

G

gyroscope.....	4-7
<i>calibrate the gyroscope</i>	8-19

L

language.....	
<i>language</i>	7-1

M

manual driving.....	5-4
manual route.....	
<i>description</i>	4-24
<i>set a manual route</i>	5-11
<i>start a manual route</i>	5-15
menu.....	
<i>routes</i>	4-13
<i>work</i>	4-10

N

note.....	2-1
-----------	-----

P

Pause button.....	2-8
-------------------	-----

R

route.....	
<i>blockage route</i>	4-20, 4-22
<i>delete route</i>	4-18, 5-11
<i>manual route</i>	4-11, 5-15
<i>new route</i>	4-13, 5-6
<i>route analysis</i>	4-20
<i>test</i>	7-3

S

safety.....	
<i>collision detector</i>	2-9
<i>electrical safety</i>	2-2
<i>emergency stop button</i>	2-8
<i>maintenance safety</i>	2-4
<i>operating safety</i>	2-2
<i>safety decals</i>	2-4
<i>safety devices</i>	2-8
shock system.....	4-5
skirt.....	
<i>skirt height</i>	6-6
slope, maximum.....	2-2
specifications.....	-1
straight.....	4-14

T

time.....	4-22
time path.....	
<i>set a time path</i>	5-13
turn.....	5-7

U

ultrasound.....	5-9
-----------------	-----

W

waiting time.....	5-9
warning.....	2-1



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LELY INDUSTRIES N.V.

Cornelis van der Lelylaan 1

NL-3147 PB Maassluis

Tel +31 (0)88 - 12 28 221

Fax +31 (0)88 - 12 28 222

www.lely.com

— Live Life Lely —